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STATISTICAL ANALYSIS OF NOAA SOLAR/WEATHER TAPES. PROGRAM SUMMA--ETC(U)
JUN 77 G GOLTZ, L M KAISER, H WEINER

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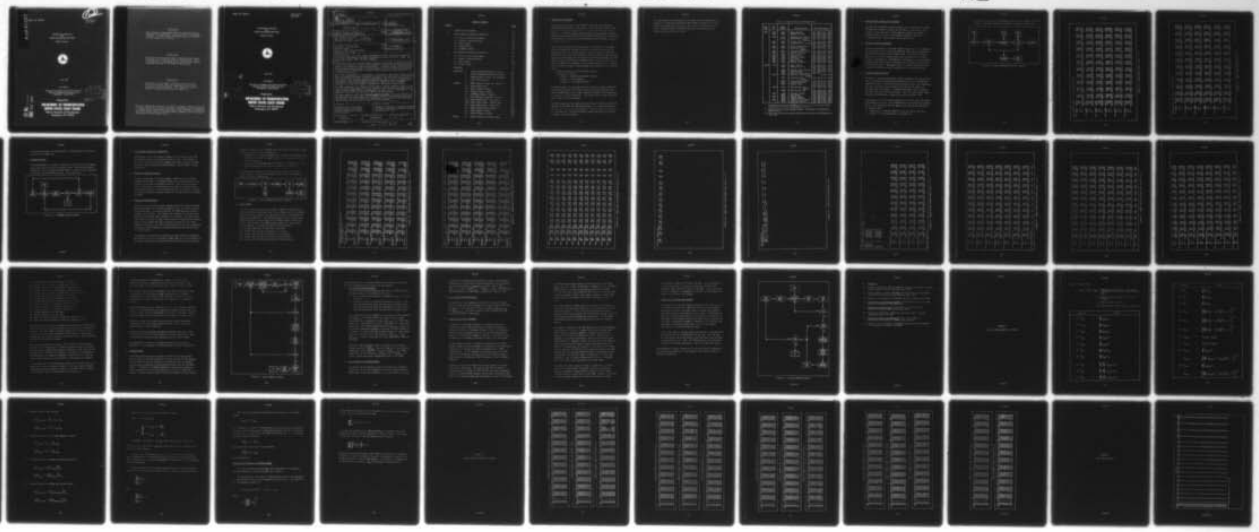

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Report No. 5040-39

CG-D-12-77
June 1977

STATISTICAL ANALYSIS OF NOAA SOLAR/WEATHER TAPES

Program Summary

June 1977

Final Report

Prepared for

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

Office of Research and Development
Washington, D.C. 20590

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16. Abstract

A major mission of the U.S. Coast Guard is the task of providing and maintaining Maritime Aids to Navigation. These aids are located on and near the coastline and inland waters of the United States and its possessions. A computer program, Design Synthesis and Performance Analysis (DSPA), has been developed by the Jet Propulsion Laboratory to demonstrate the feasibility of low-cost solar array/battery power systems for use on flashing lamp buoys.

These buoys are exposed to a wide variety of environments. The range of these environments are typified by weather conditions in locations in Alaska and the Florida coastal waters. To provide detailed, realistic temperature, wind, and solar insolation data for analysis of the flashing lamp buoy power systems, the Jet Propulsion Labpratory developed two DSPA support computer program sets: MERGE and STAT. A general description of these two packages is presented in this program summary report.

The MERGE program set will enable the Coast Guard to combine temperature and wind velocity data (NOAA TDF-14 tapes) with solar insolation data (NOAA DECK-280 tapes) onto a single sequential "MERGE" file containing up to 12 years of hourly observations. This MERGE file can then be used as direct input to the DSPA program.

The STAT program set will enable ~~the Coast Guard to perform~~, a statistical analysis of the MERGE data and produce high or low or mean profiles of the data and/or do a worst case analysis. The STAT output file consists of a one-year set of hourly statistical weather data which can be used as input to the DSPA program.

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1. INTRODUCTION AND SUMMARY

A major mission of the U.S. Coast Guard is the task of providing and maintaining Maritime Aids to Navigation. These aids are located on and near the coastline and inland waters of the United States and its possessions. A computer program, Design Synthesis and Performance Analysis (DSPA), has been developed by the Jet Propulsion Laboratory to demonstrate the feasibility of low-cost solar array/battery power systems for use on flashing lamp buoys.

These buoys are exposed to a wide variety of environments. The range of these environments are typified by weather conditions in locations in Alaska and the Florida Coastal waters. To provide detailed, realistic temperature, wind, and solar insolation data for analysis of the flashing lamp buoy power systems, the Jet Propulsion Laboratory developed two DSPA support computer program sets: MERGE and STAT. A general description of these two packages is presented in this program summary report. Details on the content and usage of these packages are presented in the following reports:

Program Documentation (DS/PA Computer Program):
(JPL Report No. 5040-27)

- Volume I - Software Requirements Document.
- Volume II - User's Manual.
- Volume III - Programmer's Manual.

The MERGE program set will enable the Coast Guard to combine temperature and wind velocity data (NOAA TDF-14 tapes) with solar insolation data (NOAA DECK-280 tapes) onto a single sequential "MERGE" file containing up to 12 years of hourly observations. This MERGE file can then be used as direct input to the DSPA program.

The STAT program set will enable the Coast Guard to perform a statistical analysis of the MERGE data and produce high or low or mean profiles of the data and/or do a worst case analysis. The STAT output file consists of a one-year set of hourly statistical weather data which can be used as input to the DSPA program.

The final phase of the development of the DSPA support programs was the production of MERGE and intermediate STATS (MERGE averages file for subsequent profiling) files for each of the 15 Coast Guard selected locations. The NOAA TDF-14 and DECK-280 data used for generating these files are shown in Table 1-1 below.

TABLE 1-1.-INDEX TO NOAA SOLAR/WEATHER TAPES

Tape Type	Reel No.	Station Number	Station Location	Time Period Covered
TDF14	X788	12839	Miami, Florida	Jan. 1955 to Dec. 1964
	X789	12919	Brownsville, Texas	Jan. 1953 to Dec. 1956
				Jan. 1959 to Dec. 1964
	X790*	13745	Hatteras, North Carolina	Jan. 1955 to Feb. 1957
		(93729)	(Cape Hatteras, North Carolina	Mar. 1957 to Dec. 1965
	X791	14607	Caribou, Maine	Jan. 1955 to Dec. 1964
	X792	14732	La Guardia Field, New York	Jan. 1953 to Dec. 1958
				Jan. 1961 to Dec. 1964
	X793	14739	Boston, Massachusetts	Jan. 1955 to Dec. 1964
	X794	14847	Saulte Ste. Marie, Michigan	Jan. 1952 to Dec. 1961
	X795	23174	Los Angeles, California	Jan. 1955 to Dec. 1964
	X796	24233	Seattle, Washington	Jan. 1955 to Dec. 1964
	X797	26615	Bethel, Alaska	Jan. 1952 to Dec. 1961
	X799	13743	Washington, D.C.	Jan. 1955 to Dec. 1964
	X800	13983	Columbia, Missouri	Jan. 1955 to Dec. 1964
	X801	23154	Ely, Nevada	Jan. 1955 to Dec. 1964
	X802	24225	Medford, Oregon	Jan. 1955 to Dec. 1964
	X803	93193	Fresno, California	Jan. 1955 to Dec. 1964
DECK280	X804**	12839	Miami, Florida	Jan. 1955 to Dec. 1964
		12919	Brownsville, Texas	Jan. 1953 to Dec. 1955
				Jan. 1959 to Dec. 1965
		13745	Hatteras, North Carolina	Jan. 1955 to Feb. 1957
		14607	Caribou, Maine	Jan. 1955 to Dec. 1964
		14753	Blue Hill, Massachusetts	Jan. 1955
	X805**	14753	Blue Hill, Massachusetts (cont)	to Dec. 1964
		14847	Saulte Ste. Marie, Michigan	July 1952 to Aug. 1958
		23174	Los Angeles, California	Jan. 1962 to Dec. 1966
		24233	Seattle, Washington	Jan. 1955 to Dec. 1964
		26615	Bethel, Alaska	July 1952 to Oct. 1952
				Dec. 1956 to Apr. 1957
	X806**	93729	Cape Hatteras, North Carolina	Mar. 1957 to Dec. 1964
		94706	New York, New York	Jan. 1953 to Dec. 1958
				Jan. 1963 to Dec. 1964
	X807	13983	Columbia, Missouri	Jan. 1955 to Dec. 1964
		23154	Ely, Nevada	Jan. 1955 to Dec. 1964
	X808	24225	Medford, Oregon	Jan. 1955 to Dec. 1964
		93193	Fresno, California	Jan. 1955 to Dec. 1964
	X809	93722	Silver Hill, Maryland***	Jan. 1955 to Dec. 1960
		93734	Sterling, Virginia***	Jan. 1961 to Dec. 1964

* The Hatteras and Cape Hatteras TDF14 data had to be combined into one file to facilitate the building of the skeleton MERGE file

** No End-of-File mark exists between stations - this problem is handled by the DECK280 program.

*** Solar insolation data from these two files are for use with the Washington, D.C. TDF14 data.

2. MERGE COMPUTER PROGRAM SET DESCRIPTION

The features of the MERGE computer program set, consisting of the TDF14, DECK280, and LISTMERGE routines, are discussed in this section. The elements of this discussion include specific program requirements, computer program rationale, TDF14 program, DECK280 program, and LISTMERGE program. These elements are presented below.

2.1 Specific Program Requirements

The major requirement of the MERGE computer program set is to combine the solar insolation data from the NOAA DECK-280 tapes with the temperature and wind velocity data from the TDF-14 tapes. The resultant output, a MERGE file, is to be a computer data file consisting of no more than 12 years of information. The MERGE file information is to be recorded on an hourly basis and stored on one-day records, all days being stored in Julian date sequence. Temperature data is in degrees Fahrenheit; wind velocity is in knots, and solar insolation is in watts/square meter.

2.2 Computer Program Rationale

The basis for selecting the proper computer program for meeting the Coast Guard requirements was determined by examination of the necessary DSPA weather data input. Generally the DSPA program requires that temperature and solar insolation values be known (wind velocity was added as a possible future requirement). Accuracy requirements further dictated that data observations should be hourly. Use of the NOAA weather tapes provided the needed data, though not in a very accessible form.

Investigation of the NOAA tapes revealed that the TDF-14 data was edited and sequentially stored, but the DECK-280 data was unedited and unsorted. Hence, it was determined that the MERGE process should be performed in two separate steps:

1) Generation of a skeletal MERGE file from the TDF-14 tape data.
2) Addition of the DECK-280 data to the MERGE file.

An overview flow diagram of the MERGE program is shown in Figure 2-1 below. A sample of the MERGE output file contents is provided in Figure 2-2.

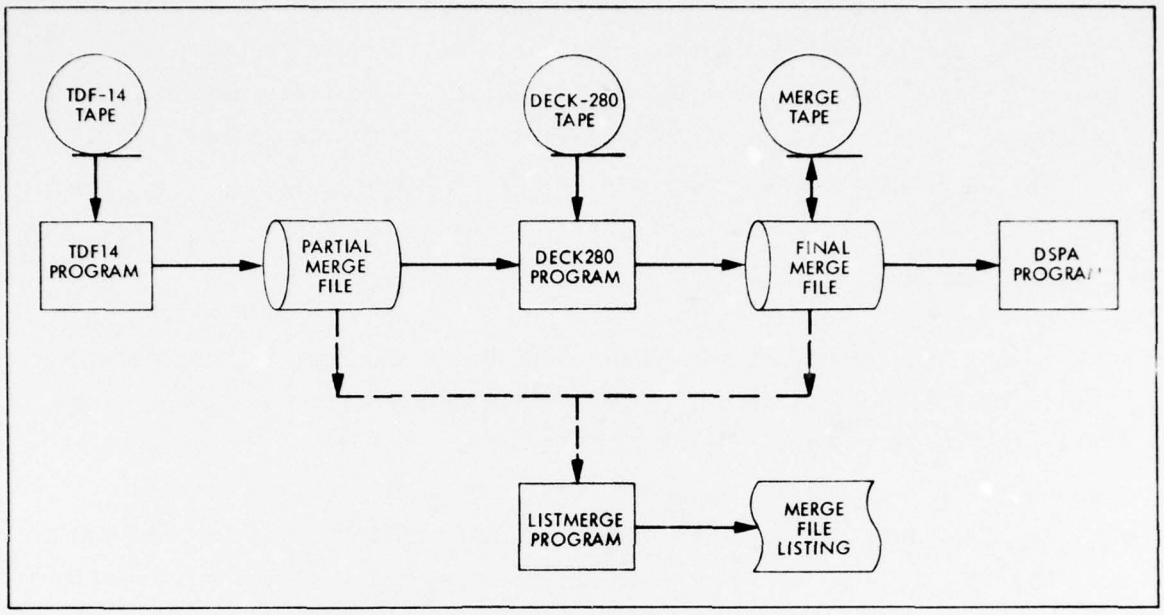


FIGURE 2-1. MERGE COMPUTER PROGRAM SET OVERVIEW

```
ENTER START DATE (YYDDD) AND NO. OF RECORDS TO DISPLAY

DATE = 55001   SECTOR =     0
      TEMP =    49.00    50.00    50.00    50.00    50.00    51.00    51.00    51.00    50.00    54.00    54.00    55.00
                55.00    55.00    50.00    54.00    54.00    53.00    54.00    54.00    50.00    54.00    60.00    60.00
      WIND =     3.00     6.00      .00     6.00     4.00     4.00     4.00     4.00     2.00     3.00     3.00      .00
                 .00     3.00     3.00     4.00     3.00     4.00     2.00     3.00     3.00     2.00     6.00     4.00
      QST =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00
             -1000.00 -1000.00 -1000.00    19.76 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DATE = 55002   SECTOR =     3
      TEMP =    60.00    61.00    60.00    61.00    62.00    57.00    58.00    59.00    50.00    55.00    55.00    56.00
                56.00    58.00    50.00    59.00    57.00    55.00    56.00    56.00    50.00    55.00    53.00    53.00
      WIND =     6.00     7.00     1.00    10.00    12.00    16.00    16.00    11.00    19.00     7.00     5.00     8.00
                10.00    12.00    18.00    13.00     9.00     4.00     9.00     8.00     5.00     8.00     9.00    10.00
      QST =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00     9.30    18.60    34.87   469.54   478.84   612.49
              540.43   412.59   203.39    40.68 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DATE = 55003   SECTOR =     6
      TEMP =    52.00    50.00    50.00    48.00    48.00    48.00    48.00    47.00    40.00    51.00    52.00    52.00
                54.00    54.00    50.00    55.00    51.00    47.00    49.00    49.00    40.00    48.00    47.00    46.00
      WIND =     9.00     8.00      .00     6.00     9.00     9.00    10.00     8.00     9.00     8.00    10.00    10.00
                10.00    11.00    14.00    11.00    10.00     6.00     8.00     7.00     9.00     4.00     3.00     4.00
      QST =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    44.16   202.23   417.24   555.54   648.52   653.17
              579.95   438.16   249.88    54.62 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DATE = 55004   SECTOR =     9
      TEMP =    47.00    48.00    50.00    53.00    52.00    52.00    52.00    52.00    50.00    53.00    52.00    54.00
                54.00    54.00    50.00    56.00    57.00    54.00    53.00    50.00    50.00    51.00    50.00    49.00
      WIND =     3.00     7.00      .00    10.00    12.00    10.00    10.00    10.00    13.00    13.00    15.00    11.00
                 9.00     6.00     7.00     4.00     3.00     4.00     3.00     3.00      .00     7.00     5.00     4.00
      QST =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    18.60    56.95   160.39   457.70   613.65   626.58
              503.24   244.07   196.42    55.79 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DATE = 55005   SECTOR =    12
      TEMP =    49.00    50.00    40.00    49.00    49.00    48.00    47.00    47.00    40.00    48.00    48.00    50.00
                50.00    50.00    50.00    48.00    48.00    47.00    47.00    47.00    40.00    47.00    48.00    47.00
      WIND =     8.00     8.00     9.00    10.00    12.00    14.00    13.00    15.00    17.00    15.00    11.00    14.00
                12.00    11.00      .00     8.00     8.00     8.00     6.00    10.00     7.00     5.00     5.00     5.00
      QST =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    25.57   225.47   277.77   469.54   607.84   609.00
              382.37   270.80   163.87    34.87 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DATE = 55006   SECTOR =    15
      TEMP =    48.00    49.00    50.00    50.00    50.00    49.00    60.00    59.00    60.00    60.00    62.00    63.00
                64.00    64.00    60.00    60.00    60.00    59.00    60.00    60.00    50.00    50.00    49.00    47.00
      WIND =     4.00     6.00      .00     4.00     4.00    12.00    13.00    13.00    10.00    13.00    16.00    15.00
                15.00    15.00    11.00    16.00    17.00    15.00    16.00    11.00    19.00    20.00    21.00    21.00
      QST =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    36.03   196.42   389.34   533.46   603.19   596.22
              511.38   299.85   127.84    44.16 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00
```

FIGURE 2-2. SAMPLE MERGE OUTPUT (Sheet 1 of 3)

```
ENTER START DATE (YYDDD) AND NO. OF RECORDS TO DISPLAY

DATE = 59363   SECTOR =  5478
     TEMP =    64.00   62.00   50.00   57.00   56.00   54.00   54.00   53.00   50.00   54.00   53.00   54.00
               55.00   54.00   50.00   54.00   53.00   51.00   50.00   49.00   40.00   49.00   49.00   49.00
     WIND =    18.00   20.00   18.00   15.00   14.00   13.00   15.00   14.00   14.00   15.00   17.00   15.00
               18.00   20.00   13.00   19.00   17.00   17.00   17.00   16.00   19.00   14.00   13.00   13.00
     QST  = -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   53.46  191.77  316.12  557.87  609.00
             448.62  348.67  437.00  206.88   47.65 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DATE = 59364   SECTOR =  5481
     TEMP =    48.00   48.00   40.00   47.00   46.00   46.00   45.00   44.00   40.00   47.00   48.00   49.00
               49.00   50.00   40.00   48.00   48.00   45.00   44.00   44.00   40.00   44.00   45.00   45.00
     WIND =    11.00   11.00   18.00   11.00   13.00   14.00    8.00    8.00    4.00    7.00    9.00   10.00
               10.00    8.00   19.00   11.00   10.00    6.00    4.00    4.00    4.00    5.00    5.00    7.00
     QST  = -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   51.14  226.63  416.08  562.52  639.22
             609.00  389.34  212.69  139.47   31.38 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DATE = 59365   SECTOR =  5484
     TEMP =    46.00   44.00   40.00   45.00   47.00   46.00   43.00   42.00   40.00   45.00   47.00   46.00
               46.00   45.00   40.00   44.00   43.00   42.00   41.00   42.00   40.00   42.00   41.00   41.00
     WIND =     6.00    6.00    4.00    6.00    8.00    8.00    6.00    7.00    3.00   12.00   13.00   14.00
               15.00   16.00   16.00   14.00   13.00   10.00   10.00    8.00    2.00    9.00    7.00    7.00
     QST  = -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   51.14  176.66  355.64  310.31  345.18
             301.02  409.10  307.99  224.31   41.84 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DATE = 60001   SECTOR =  5490
     TEMP =    41.00   40.00   40.00   40.00   40.00   40.00   39.00   39.00   40.00   42.00   42.00   43.00
               45.00   44.00   40.00   43.00   43.00   42.00   42.00   43.00   40.00   45.00   45.00   45.00
     WIND =     7.00   10.00   11.00    8.00   10.00    8.00   11.00    5.00    .00    8.00    9.00   10.00
               11.00    9.00   14.00   11.00   10.00    9.00   10.00    8.00   14.00   12.00   11.00    9.00
     QST  = -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   32.54  177.82  271.96  325.42  495.11
             524.16  380.05  224.31  112.74   27.89 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DATE = 60002   SECTOR =  5493
     TEMP =    46.00   46.00   40.00   47.00   48.00   49.00   49.00   48.00   40.00   51.00   53.00   56.00
               58.00   61.00   60.00   62.00   60.00   59.00   59.00   60.00   60.00   61.00   61.00   62.00
     WIND =     8.00    8.00    7.00   10.00   10.00    9.00    8.00    9.00    9.00   10.00   10.00   10.00
               9.00    6.00    3.00    7.00    8.00    8.00    6.00   10.00   11.00   12.00   16.00   15.00
     QST  = -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   47.65  211.52  393.99  563.68  628.76
             576.46  391.67  242.90  130.17   30.22 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DATE = 60003   SECTOR =  5496
     TEMP =    63.00   62.00   60.00   64.00   65.00   65.00   63.00   63.00   60.00   64.00   65.00   67.00
               65.00   64.00   60.00   58.00   57.00   56.00   54.00   54.00   50.00   52.00   51.00   50.00
     WIND =    17.00   17.00   13.00   19.00   20.00   24.00   24.00   26.00   24.00   27.00   24.00   26.00
               28.00   27.00   10.00   10.00    6.00    7.00    6.00    8.00   13.00   10.00    8.00    8.00
     QST  = -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    4.65   17.43   37.19  104.60  103.44
             106.92   65.08   80.19   97.63   60.44 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00
```

FIGURE 2-2. SAMPLE MERGE OUTPUT (Sheet 2 of 3)

```
ENTER START DATE (YYDDD) AND NO. OF RECORDS TO DISPLAY

DATE = 64363   SECTOR = 10968
      TEMP =    46.00    46.00    40.00    46.00    46.00    46.00    46.00    46.00    40.00    47.00    48.00    49.00
                48.00    49.00    40.00    48.00    48.00    46.00    45.00    44.00    30.00    38.00    36.00    35.00
      WIND =    11.00    10.00    16.00    12.00     9.00     8.00     8.00    11.00     6.00     9.00     9.00     9.00
                 8.00     7.00     9.00     7.00     9.00     7.00     7.00     6.00     9.00     6.00     5.00     4.00
      QST =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00     9.30    89.49   180.14   244.07   213.85
              244.07   244.07   267.31   196.42    47.65 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DATE = 64364   SECTOR = 10971
      TEMP =    36.00    46.00    40.00    47.00    46.00    41.00    38.00    37.00    40.00    52.00    56.00    58.00
                60.00    59.00    60.00    61.00    60.00    57.00    57.00    56.00    50.00    57.00    57.00    57.00
      WIND =     6.00     5.00     7.00     3.00     3.00     3.00      .00     3.00     1.00     6.00     9.00     8.00
                10.00    11.00    11.00    11.00    10.00    11.00    11.00    12.00    18.00    10.00    12.00    11.00
      QST =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    46.49   211.52   364.94   480.00   536.95
              536.95   474.19   356.80   205.71    41.84 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DATE = 64365   SECTOR = 10974
      TEMP =    56.00    55.00    50.00    54.00    53.00    52.00    52.00    52.00    50.00    55.00    55.00    54.00
                52.00    51.00    50.00    51.00    51.00    49.00    48.00    47.00    40.00    48.00    48.00    48.00
      WIND =    11.00    10.00    15.00    12.00    13.00    12.00    13.00    12.00    13.00    14.00    11.00    15.00
                15.00    15.00    11.00     9.00    10.00     8.00     8.00     7.00     7.00     6.00     6.00     6.00
      QST =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    37.19   195.25   320.77   471.86   549.73
              536.95   473.02   370.75   216.17    51.14 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00
```

FIGURE 2-2. SAMPLE MERGE OUTPUT (Sheet 3 of 3)

2.3 TDF14 Program

The TDF14 program, shown in Figure 2-3, controls the building of the skeletal MERGE file from the NOAA TDF-14 data tape. The user requests the creation of a MERGE file to span a particular period of years for a selected TDF-14 location. The TDF14 program then extracts the d temperature, and wind velocity information from the input tape, ds a one-day record consisting of 24 hourly observations of temperature and wind velocity and space for solar insolation, and sequentially writes the day's data to a MERGE file.

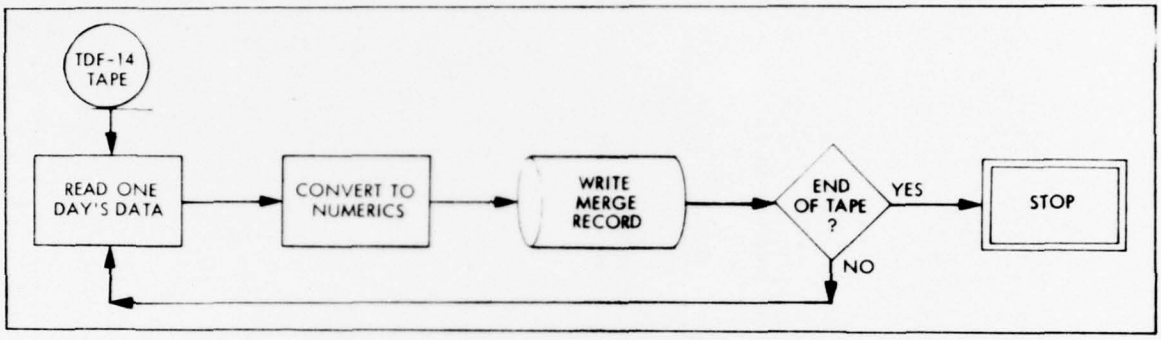


FIGURE 2-3. TDF14 COMPUTER PROGRAM

2.4 DECK280 Program

Addition of solar insolation data to a MERGE file created by TDF14 is performed by the DECK280 program (Figure 2-4). The user requests that, for a particular MERGE location, NOAA DECK-280 tape data from a specified location be inserted into the file. The DECK280 program extracts the solar radiation data (in Langleys) from the NOAA tape, converts the data

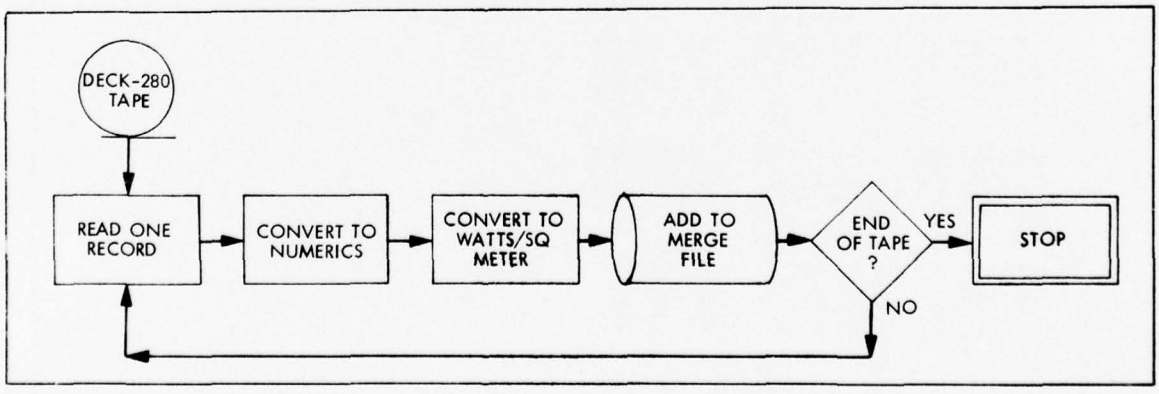


FIGURE 2-4. DECK280 COMPUTER PROGRAM

to watts/square meter, and adds the data to the appropriate day and hour position in the *MERGE file*.

2.5 LISTMERGE Program

The average MERGE file consists of from 10 to 12 years of hourly temperature, wind velocity, and solar insolation data. The LISTMERGE program permits the user to randomly view any number of sequential days beginning at any date contained within the file. (See Figure 2-5).

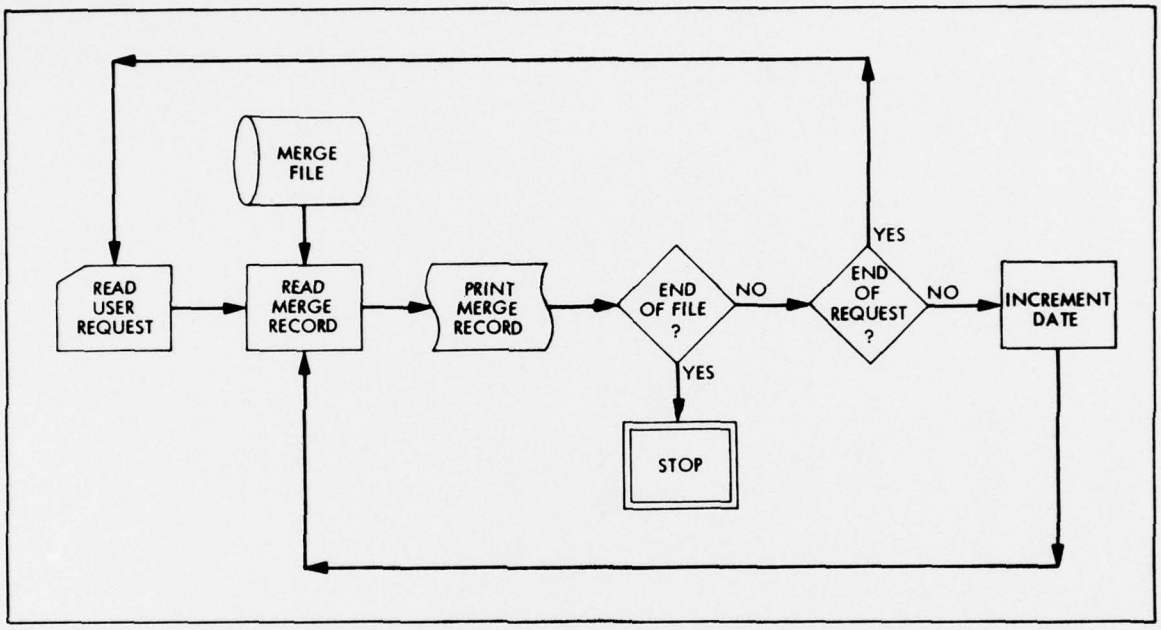


FIGURE 2-5. LISTMERGE COMPUTER PROGRAM

3. STAT COMPUTER PROGRAM SET DESCRIPTION

The features of the STAT computer program set, consisting of the STATS and PROFILE routines, are discussed in this section. The elements of this discussion include specific program requirements, computer program rationale, STATS program, and PROFILE program. These elements are presented below.

3.1 Specific Program Requirements

The major requirement of the STAT computer program set is to perform a statistical analysis of the MERGE weather data, producing high or low or mean or worst case environmental profiles. The user must be able to control the selection of alternative profile types on a monthly basis. The resultant output is to be a computer data file consisting of one year of statistical weather information stored in the same format as the MERGE file data.

3.2 Computer Program Rationale

The basis for selecting the proper computer program for meeting the Coast Guard requirements was determined by examination of the process involved in profiling data. To produce a profile, the MERGE data must first be averaged over all years. This "means" data represents a "smoothed over" year with an extremely small likelihood of occurrence. The user, therefore, needs to be able to adjust the information by applying some scaling factor to the averaged data and, if desired, performing a worst case analysis of the data. The Coast Guard required that the user be permitted to treat each month separately, yielding different scale factors and/or worst case periods.

Investigations indicated that a process involving reading and averaging and profiling of the 10 to 12 years of MERGE data, all in one step and for each time a new statistical profile was required, would be prohibitively

expensive. Hence, it was determined that the statistical analysis process should be performed in two separate steps:

1) Generation of a one-year averages file, directly from the MERGE file, for permanent storage on magnetic tape (i.e., executed one time only for each location).
2) Profiling of the averages data, as required, for input to the DSPA program (approximately 4 times less expensive than step 1).

An overview flow diagram of the STAT program is shown in Figure 3-1 below. Samples of the STATS and PROFILE output files are provided in Figures 3-2 and 3-3 respectively.

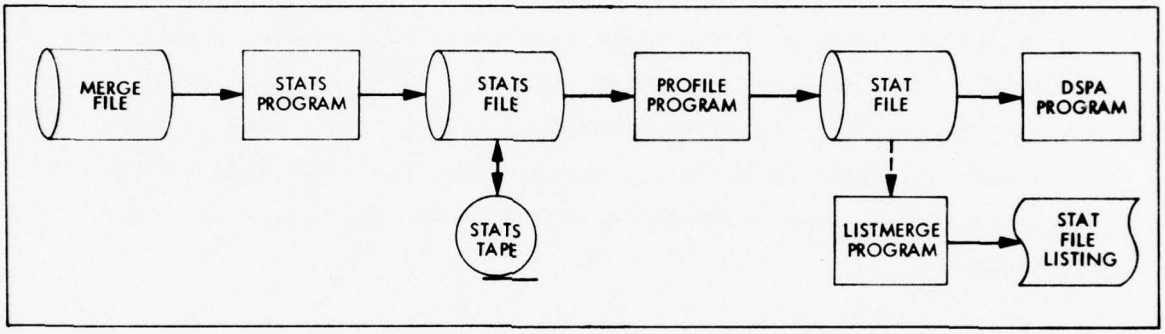


FIGURE 3-1 *STAT COMPUTER PROGRAM SET OVERVIEW*

3.3 STATS Program

The STATS program uses the 10 to 12 years of MERGE file weather data to produce a one-year statistical file. The procedure involves the averaging of data for a given hour of a given day for each of the years contained in the MERGE file. The statistical data is then written onto a STATS file which is used as input to the PROFILE program (Section 3.4 below). Specifically, the STATS program computes and outputs (both to the STATS and to the printer) the following statistics:

1a) Average temperature for each hour of one year.
1b) Average wind velocity for each hour of one year.
1c) Average solar insolation for each hour of one year.
2a) Average wind velocity for each day of each data year.
2b) Average solar insolation for each day of each data year.

STATISTICAL ANALYSIS FOR STATION NUMBER 13745
LIMIT DATES = 55001 TO 64366
TIME SPAN = 10 YEARS

DAY = 1 SECTOR = 0
AVERAGE DAILY WIND VELOCITY = 10.96 KNOTS, AVERAGE DAILY SOLAR INSOLATION = 282.17 WATTS/SQ.M

TEMP =	45.40	45.10	41.00	45.40	46.80	47.20	47.20	47.40	44.00	48.70	49.90	50.80
	50.90	51.00	47.00	50.10	49.30	47.50	47.20	45.70	40.00	45.20	45.50	45.00
WIND =	10.80	10.80	10.20	11.00	10.70	10.50	10.80	11.00	10.30	9.70	11.10	11.50
	11.40	11.60	12.70	11.90	11.20	10.90	10.50	9.40	11.80	10.40	11.40	11.50
QDT =	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	47.65	102.13	223.44	344.94	512.04	445.80
	434.01	350.83	238.45	96.96	47.26	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00
DAILY WIND =	3.17	7.71	12.58	10.46	10.25	9.38	14.42	10.58	13.00	18.08	-1000.00	-1000.00
DAILY QDT =	-1000.00	402.13	326.82	217.22	161.88	257.20	-1000.00	-1000.00	365.29	286.84	-1000.00	-1000.00

DAY = 2 SECTOR = 4
AVERAGE DAILY WIND VELOCITY = 11.03 KNOTS, AVERAGE DAILY SOLAR INSOLATION = 329.43 WATTS/SQ.M

TEMP =	44.90	44.10	40.00	44.00	43.20	42.80	42.10	41.90	37.00	42.50	43.20	44.10
	44.60	45.80	42.00	46.30	45.30	43.70	43.40	43.70	41.00	44.50	44.20	43.30
WIND =	12.80	13.00	10.30	12.40	12.30	13.20	13.00	12.40	12.20	11.20	11.40	11.50
	11.80	11.30	11.40	11.10	10.20	8.60	9.20	8.70	6.30	9.20	9.90	10.20
QDT =	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	31.38	87.66	202.66	349.20	438.03	786.70
	484.90	411.04	255.69	122.96	36.73	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00
DAILY WIND =	9.71	8.46	18.42	12.71	8.92	9.12	9.17	10.54	8.37	14.42	-1000.00	-1000.00
DAILY QDT =	282.07	132.96	375.98	300.58	-1000.00	321.70	489.41	410.70	347.50	373.85	-1000.00	-1000.00

DAY = 3 SECTOR = 8
AVERAGE DAILY WIND VELOCITY = 11.17 KNOTS, AVERAGE DAILY SOLAR INSOLATION = 266.66 WATTS/SQ.M

TEMP =	43.10	42.80	38.00	42.30	42.00	42.20	41.70	41.40	37.00	44.40	45.90	46.90
	48.30	48.50	43.00	48.10	46.90	44.80	44.50	44.40	40.00	44.20	44.00	43.70
WIND =	10.30	10.10	9.30	10.30	10.80	11.50	11.90	11.00	12.20	11.90	11.80	12.60
	12.80	13.30	13.00	12.30	11.10	11.00	10.60	11.00	9.10	9.50	9.30	10.30
QDT =	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	30.22	73.48	205.42	343.76	420.00	460.24
	419.75	365.44	250.87	105.60	57.72	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00
DAILY WIND =	8.04	5.33	10.87	15.08	9.87	16.75	14.46	10.37	7.42	13.04	-1000.00	-1000.00
DAILY QDT =	384.35	188.74	342.62	139.93	313.80	67.76	-1000.00	417.70	-1000.00	-1000.00	-1000.00	-1000.00

DAY = 4 SECTOR = 12
AVERAGE DAILY WIND VELOCITY = 11.28 KNOTS, AVERAGE DAILY SOLAR INSOLATION = 296.68 WATTS/SQ.M

TEMP =	43.90	44.10	39.00	43.70	43.50	42.60	42.50	42.00	38.00	44.80	46.20	47.10
	48.10	48.60	46.00	48.60	47.60	45.80	45.00	44.10	39.00	43.90	43.10	42.40
WIND =	11.00	11.50	8.60	11.00	11.10	10.10	9.50	9.60	9.60	10.80	12.20	12.60
	12.90	12.20	12.10	13.00	11.80	11.50	11.30	11.00	10.80	11.60	12.10	11.60
QDT =	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	27.60	83.39	235.35	386.87	474.62	466.31
	500.66	357.71	267.31	125.52	47.65	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00
DAILY WIND =	7.04	16.62	12.12	17.50	9.17	6.75	12.17	10.37	9.08	11.46	-1000.00	-1000.00
DAILY QDT =	260.34	30.68	308.45	283.12	275.21	329.37	405.85	421.19	-1000.00	350.99	-1000.00	-1000.00

DAY = 5 SECTOR = 16
AVERAGE DAILY WIND VELOCITY = 10.44 KNOTS, AVERAGE DAILY SOLAR INSOLATION = 329.83 WATTS/SQ.M

TEMP =	42.20	41.40	37.00	40.30	39.80	39.20	39.10	38.00	34.00	41.40	43.00	44.10
	44.90	45.40	41.00	44.70	44.50	42.40	41.10	40.30	35.00	40.30	40.10	40.40
WIND =	11.70	11.70	9.70	11.50	11.00	12.70	11.90	11.90	11.80	10.80	10.30	10
	11.40	11.90	10.40	10.40	9.20	7.90	8.30	8.60	8.80	8.70	8.50	.90
QDT =	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	20.63	83.16	210.48	342.25	528.00	575.18
	533.11	445.01	295.32	140.75	54.04	-1000.00	-1000.00	-1000.00	-1000.00	-1000.00	1000.00	-1000.00
DAILY WIND =	9.62	10.92	13.50	13.62	17.67	5.83	5.29	4.25	7.83	7.37	-1000.00	-1000.00

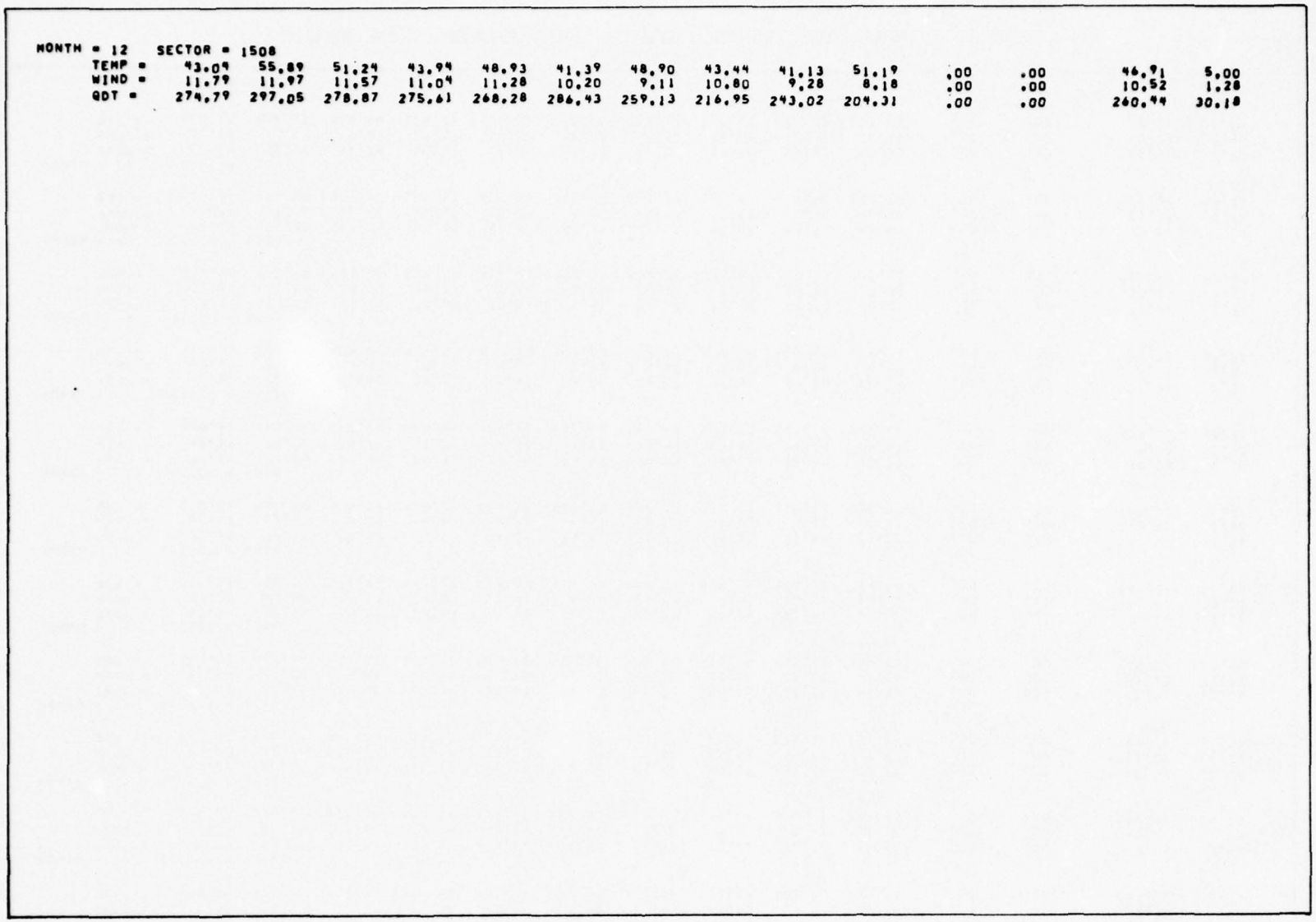
FIGURE 3-2A. SAMPLE STATS OUTPUT-DAILY DATA (Sheet 1 of 2)

```
DAILY QDT =     306.71   358.66    68.45   369.35   416.89   341.34   389.81   381.33   352.80   245.56 -1000.00 -1000.00

DAY =   6   SECTOR =   20
   AVERAGE DAILY WIND VELOCITY =      9.41 KNOTS,  AVERAGE DAILY SOLAR INSOLATION =    280.08 WATTS/SQ.M
      TEMP =   39.80   41.20   37.00   41.10   40.10   40.00   40.90   41.80   39.00   45.20                    47.80
               48.70   49.10   46.00   49.70   49.60   47.90   46.60   46.10   43.00   46.50                    44.70
      WIND =    8.90    8.70    8.20    9.70    9.20   10.10    9.40    9.40    9.20    9.30                     9.60
               10.20    9.90   10.40    9.50    9.60    8.80    8.60    8.70    9.20    9.90                     8.40
       QDT = -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   39.81  107.85  254.99  368.77                   490.07
              436.27  318.19  211.65   97.50   34.63 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00                -1000.00
DAILY WIND =   12.79    8.71   10.42    4.08   16.12    6.67    8.37   14.21    3.13    9.21                    -1000.00
DAILY QDT =   333.79  349.48  262.08  397.71  416.42   43.23  405.38   85.77  181.89 -1000.00                  -1000.00

DAY =   7   SECTOR =   24
   AVERAGE DAILY WIND VELOCITY =     13.11 KNOTS,  AVERAGE DAILY SOLAR INSOLATION =    248.41 WATTS/SQ.M
      TEMP =   44.30   45.20   41.00   45.00   44.70   44.40   44.40   43.50   42.00   45.80   46.30   47.40
               48.30   49.30   44.00   48.30   47.70   46.20   45.80   46.00   40.00   45.50   45.30   45.00
      WIND =    6.50   11.20   10.30   12.50   11.90   11.90   10.90   11.50    9.30   11.00   12.90   13.80
               13.40   13.60   14.40   15.50   16.40   13.90   14.30   14.40   16.70   15.30   15.30   14.80
       QDT = -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   17.72   59.14  151.48  253.62  404.31  437.77
              427.44  352.80  240.06  113.25   40.68 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00
DAILY WIND =   17.79   16.17    9.58   15.21    8.96    8.83   11.67   19.58   10.62   12.29 -1000.00 -1000.00
DAILY QDT =   379.70  293.34  309.50   24.41  326.70   69.97  343.79  387.37 -1000.00   68.76 -1000.00 -1000.00

DAY =   8   SECTOR =   28
   AVERAGE DAILY WIND VELOCITY =     12.09 KNOTS,  AVERAGE DAILY SOLAR INSOLATION =    245.32 WATTS/SQ.M
      TEMP =   44.70   44.10   40.00   43.00   42.60   41.70   41.30   40.80   36.00   42.20   43.40   43.70
               44.30   44.60   40.00   45.00   44.60   43.30   42.40   43.20   39.00   43.00   42.70   42.60
      WIND =   14.40   14.30   12.50   13.60   13.30   12.90   12.30   12.70   13.00   12.90   12.40   12.10
               11.80   11.30    9.90   10.50   10.70    9.90    9.90   10.80   10.10   12.50   12.30   12.80
       QDT = -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   36.80   91.38  246.78  368.17  382.02  384.70
              335.75  243.37  201.99  106.23   38.55 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00
DAILY WIND =    9.25   22.54   10.00   14.12   10.87    9.67   12.12   13.37    8.92    9.50 -1000.00 -1000.00
DAILY QDT =   396.43   76.82  414.91  341.93  130.05  402.13  228.83  195.02  216.84   49.16 -1000.00 -1000.00

DAY =   9   SECTOR =   32
   AVERAGE DAILY WIND VELOCITY =     12.17 KNOTS,  AVERAGE DAILY SOLAR INSOLATION =    272.99 WATTS/SQ.M
      TEMP =   42.30   41.60   37.00   40.80   40.20   39.80   39.70   39.10   36.00   42.10   43.40   44.20
               44.80   45.30   40.00   46.30   45.60   44.50   43.40   42.30   38.00   41.90   41.90   43.60
      WIND =   13.10   12.60   11.90   13.00   12.60   12.30   12.10   11.20   10.30   11.40   13.50   13.20
               13.40   13.80   12.90   11.30   11.00   10.60   12.00   10.90   10.70   11.80   12.60   12.60
       QDT = -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   18.60   71.59  196.65  315.54  395.04  431.30
              426.65  377.84  277.54  134.95   59.51 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00
DAILY WIND =    8.67   19.12   11.58   13.92   16.75    9.33   14.71    7.50    6.04   13.54 -1000.00 -1000.00
DAILY QDT =   119.94   49.63   41.03  384.46  507.46  402.13  429.56  437.34  339.37   41.38 -1000.00 -1000.00

DAY =  10   SECTOR =   36
   AVERAGE DAILY WIND VELOCITY =     13.05 KNOTS,  AVERAGE DAILY SOLAR INSOLATION =    243.41 WATTS/SQ.M
      TEMP =   43.00   42.80   38.00   43.70   43.40   43.40   43.10   43.10   39.00   44.60   46.00   46.50
               46.30   47.10   42.00   46.40   45.80   43.80   43.40   42.70   39.00   42.20   42.20   41.80
      WIND =   11.90   11.70   14.20   11.20   11.50   12.50   12.60   12.80   13.00   14.20   14.10   15.00
               14.70   15.00   15.50   12.50   12.80   12.40   13.40   12.10   12.40   12.60   11.70   12.10
       QDT = -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   32.54   90.65  214.87  307.70  363.78  382.95
              409.97  274.57  219.66  130.30   45.04 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    0.00
DAILY WIND =    9.79   14.92   22.21   12.21   13.79   12.29    6.62   14.75    6.71   14.67 -1000.00    0.00
DAILY QDT =   240.93   43.12  241.97  405.38 -1000.00  256.27 -1000.00   30.92  345.88  407.55 -1000.00    0.00
```

FIGURE 3-2A. SAMPLE STATS OUTPUT-DAILY DATA (Sheet 2 of 2)

MONTH = 1	SECTOR = 1464													
TEMP =	42.89	38.42	44.78	40.81	43.37	46.12	41.75	45.74	41.55	46.48	.00	.00	43.19	2.62
WIND =	11.80	11.90	12.74	11.71	10.11	9.98	10.94	11.00	8.33	10.95	.00	.00	10.95	1.24
QDT =	253.50	220.27	211.27	292.02	281.89	263.32	308.36	232.44	232.70	334.81	.00	.00	263.06	40.63
MONTH = 2	SECTOR = 1468													
TEMP =	44.92	50.07	49.51	38.58	48.12	45.84	47.73	47.23	41.22	44.15	.00	.00	45.74	3.65
WIND =	12.33	11.98	12.51	13.18	9.88	11.61	12.74	9.82	12.03	11.18	.00	.00	11.73	1.14
QDT =	329.23	335.62	255.88	344.35	337.47	357.93	318.11	271.58	265.04	269.40	.00	.00	308.46	38.55
MONTH = 3	SECTOR = 1472													
TEMP =	55.25	50.65	49.96	45.15	51.38	41.02	53.87	45.87	54.48	51.79	.00	.00	49.94	4.59
WIND =	13.87	12.56	10.34	11.52	10.72	11.34	12.32	10.78	9.79	9.92	.00	.00	11.32	1.29
QDT =	417.87	390.02	402.74	355.04	394.44	415.49	406.77	320.71	383.35	331.37	.00	.00	381.78	34.51
MONTH = 4	SECTOR = 1476													
TEMP =	61.09	57.41	62.65	55.08	59.63	61.25	56.24	58.70	57.84	58.31	.00	.00	58.82	2.36
WIND =	11.40	13.79	9.84	12.26	10.42	11.30	14.20	10.34	10.19	9.21	.00	.00	11.29	1.67
QDT =	462.05	489.60	478.58	495.30	480.55	494.05	492.52	450.45	406.63	400.98	.00	.00	465.07	35.40
MONTH = 5	SECTOR = 1480													
TEMP =	67.74	65.15	68.38	65.54	69.12	66.98	62.74	67.64	62.65	65.97	.00	.00	66.19	2.22
WIND =	11.35	13.32	10.17	9.64	10.31	9.48	11.04	9.78	10.06	10.06	.00	.00	10.52	1.14
QDT =	509.33	520.63	471.71	490.22	568.04	510.35	484.72	486.39	393.12	442.58	.00	.00	487.71	46.87
MONTH = 6	SECTOR = 1484													
TEMP =	72.36	73.71	75.93	70.97	74.31	74.01	71.77	74.04	71.89	74.14	.00	.00	73.31	1.51
WIND =	10.47	12.97	8.29	10.28	8.49	9.89	12.00	10.20	9.06	8.91	.00	.00	10.05	1.51
QDT =	478.22	435.45	494.84	418.25	545.97	477.32	427.24	419.38	368.77	424.88	.00	.00	449.23	50.07
MONTH = 7	SECTOR = 1488													
TEMP =	79.40	77.83	77.33	79.21	77.60	76.79	77.94	76.81	75.94	76.77	.00	.00	77.56	1.10
WIND =	10.59	12.71	8.78	9.71	8.40	7.78	10.37	9.58	8.80	8.57	.00	.00	9.53	1.43
QDT =	508.67	482.57	497.79	505.96	484.10	462.33	482.97	508.53	463.70	377.68	.00	.00	477.43	38.93
MONTH = 8	SECTOR = 1492													
TEMP =	79.21	76.56	75.60	78.69	78.37	77.86	77.59	77.02	76.55	75.75	.00	.00	77.32	1.23
WIND =	13.24	11.42	9.65	9.32	8.21	8.42	9.56	8.06	8.25	6.94	.00	.00	9.31	1.84
QDT =	474.23	510.42	424.21	475.51	479.62	454.02	452.94	473.38	458.64	371.37	.00	.00	457.43	37.57
MONTH = 9	SECTOR = 1496													
TEMP =	74.57	72.27	75.81	72.54	74.57	73.83	75.07	71.92	69.94	73.01	.00	.00	73.35	1.76
WIND =	11.69	11.95	8.86	10.24	9.20	8.85	10.76	9.02	10.31	9.52	.00	.00	10.09	1.15
QDT =	352.10	412.75	413.30	500.45	411.72	422.55	426.90	386.08	312.13	367.01	.00	.00	400.50	50.66
MONTH = 10	SECTOR = 1500													
TEMP =	66.29	66.20	61.53	63.30	67.87	64.39	62.51	65.47	63.53	61.53	.00	.00	64.26	2.16
WIND =	10.86	12.92	10.42	10.28	10.64	8.05	8.87	9.28	11.36	10.03	.00	.00	10.27	1.36
QDT =	437.80	293.89	341.77	367.00	315.44	350.00	366.14	324.36	329.90	283.72	.00	.00	341.00	43.86
MONTH = 11	SECTOR = 1504													
TEMP =	54.56	55.64	57.75	58.22	56.85	57.29	56.31	53.75	56.03	58.73	.00	.00	56.51	1.58
WIND =	11.75	11.59	9.83	9.29	11.67	8.30	9.38	11.88	10.17	8.48	.00	.00	10.23	1.40
QDT =	328.16	308.17	255.09	274.41	279.01	298.25	292.48	265.03	271.82	258.05	.00	.00	2.24	21.79

FIGURE 3-2B. SAMPLE STATS OUTPUT-MONTHLY DATA (Sheet 1 of 2)



```
MONTH = 12   SECTOR = 1508
      TEMP =   43.09   55.89   51.24   43.94   48.93   41.39   48.90   43.44   41.13   51.19    .00    .00   46.91   5.00
      WIND =   11.79   11.97   11.57   11.04   11.28   10.20    9.11   10.80    9.28    8.18    .00    .00   10.52   1.28
      QDT  =  274.79  297.05  278.87  275.61  268.28  286.43  259.13  216.95  243.02  209.31    .00    .00  240.44  30.18
```

FIGURE 3-2B. SAMPLE STATS OUTPUT-MONTHLY DATA (Sheet 2 of 2)

```
YEARLY STATISTICS:
10 VALID YEARS OF DATA FOUND
      TMIN =    20.00      .00      .00    10.00    19.00    20.00    20.00    20.00    10.00    20.00  1000.00  1000.00
      MEAN TMIN =    13.90   TMIN STANDARD DEVIATION          8.36
      TMAX =    91.00    87.00    90.00    93.00    93.00    89.00    90.00    92.00    87.00    90.00 -1000.00 -1000.00
      MEAN TMAX =    90.20   TMAX STANDARD DEVIATION          2.15
```

FIGURE 3-2C. SAMPLE STATS OUTPUT-YEARLY DATA

```
***FOR MONTH 12, DELTA/SCALE FACTORS =
        TEMP:  -10.0691    WIND:  .7545    QDT:  .7668
$INPT
ALPHAQ  =      .9000000DE+00
ALPHAT  =      .9000000DE+00
ALPHAV  =      .9000000DE+00
ALPHMV  =      .9500000DE+00
ALPHLQ  =      .9500000DE+00
ALPHLV  =      .9500000DE+00
LH      =                -1.            -1.            -1.            +1.
                         +1.            +1
PHV     =      .7500000DE+00
PLQ     =      .7500000DE+00
PLV     =      .7500000DE+00
PQ      =      .9000000DE+00
PT      =      .9000000DE+00
PV      =      .9000000DE+00
$END
```

```
DAY = 335   SECTOR = 1002
      TEMP =     31.43     30.03     24.93     29.63     29.33     28.73     26.13     28.73     26.93     33.23     34.43     34.03
                 36.63     37.53     32.93     36.23     37.13     34.33     32.93     32.63     29.93     34.03     33.23     33.43
      WIND =      8.37      8.90      8.75      8.00      8.75      7.92      7.85      8.15      6.64      8.22      8.83      9.58
                  8.90      8.45      9.20      7.92      7.47      6.87      6.71      7.39      8.07      8.30      8.00      8.37
      QDT =  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00     32.79    175.89    274.37    388.83    428.54    416.36
                372.99    260.51    144.86     40.76       .30  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00

DAY = 336   SECTOR = 1005
      TEMP =     32.93     31.83     24.93     31.63     30.53     30.33     30.83     31.33     28.93     38.03     40.03     41.23
                 42.33     43.23     38.93     43.93     43.43     42.03     40.93     40.43     34.93     39.53     41.63     41.73
      WIND =      7.54      7.85      9.58      6.71      6.41      6.49      6.64      7.54      7.02      6.79      7.09      7.54
                  7.32      7.09      5.73      6.34      6.19      6.64      6.94      7.47      6.34      6.34      7.24      7.09
      QDT =  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00     26.24    131.79    217.70    273.94    329.32    336.45
                302.54    214.37    123.17     37.87       .00  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00

DAY = 337   SECTOR = 1008
      TEMP =     41.63     40.73     34.93     41.83     41.63     41.53     40.73     40.13     37.93     44.53     46.23     47.03
                 47.73     48.53     44.73     47.73     46.83     44.83     44.13     44.43     38.93     43.63     42.93     43.23
      WIND =      7.47      6.34      6.74      7.24      6.79      6.56      6.49      6.19      5.21      6.79      7.62      8.22
                  8.53      8.53     10.19      9.96      9.43      8.98      8.53      8.60      8.60      8.37      8.37      7.77
      QDT =  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00     24.28     94.33    182.30    242.29    346.27    339.14
                285.16    229.40    131.38     36.43  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00

DAY = 338   SECTOR = 1011
      TEMP =     43.33     43.23     39.93     42.73     42.43     41.23     41.03     40.73     37.93     44.43     45.43     45.93
                 45.73     46.63     42.93     47.33     46.03     42.93     41.33     40.73     34.93     38.93     38.93     38.83
      WIND =      7.77      7.24      6.19      7.92      7.54      6.87      7.02      6.71      5.51      7.39      7.77      8.07
                  8.15      9.98      7.02      8.07      7.70      7.24      7.47      7.39      7.02      7.54      7.62      7.62
      QDT =  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00     21.28    113.57    208.53    304.95    379.71    360.29
                375.41    238.74    125.83     29.59  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00  -1000.00

DAY = 339   SECTOR = 1014
```

FIGURE 3-3. SAMPLE PROFILE PROGRAM OUTPUT (Sheet 1 of 6)

```
      TEMP =    34.13    38.93    33.93    39.83    39.73    39.23    39.23    38.83    34.93    44.03    45.83    47.63
                48.23    48.73    42.93    48.43    48.13    45.63    44.23    43.93    39.93    43.43    42.23    41.53
      WIND =     7.32     7.47     7.70     7.85     8.30     8.00     7.32     7.17     8.37     7.32     7.47     7.39
                 7.47     7.85     8.22     7.17     6.64     6.26     5.73     5.58     4.07     6.04     5.58     6.11
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    28.52   136.70   268.23   358.77   376.36   338.39
               294.97   193.77   105.65    27.13 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 340   SECTOR = 1017
      TEMP =    40.93    40.73    35.93    39.23    38.33    37.33    36.93    36.93    34.93    40.13    41.43    42.33
                42.73    43.23    37.93    43.03    41.93    40.33    39.23    38.83    31.93    37.93    37.93    38.03
      WIND =     6.56     5.66     5.43     6.04     6.56     7.39     6.79     7.09     7.92     8.53     8.75     9.20
                 8.83     8.60    10.56     8.98     8.68     8.60     9.05     7.47     9.96     8.90     9.13     9.36
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    19.72   109.99   219.60   274.98   328.57   341.19
               262.89   217.33   115.95    25.40 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 341   SECTOR = 1020
      TEMP =    37.93    37.83    32.93    37.73    36.93    36.43    36.23    35.93    30.93    39.03    40.33    41.33
                41.33    42.03    37.93    41.83    41.03    38.13    36.93    36.83    33.93    36.53    37.13    37.03
      WIND =     9.66     9.51     8.83     9.73     9.51     8.98     8.68     8.37    10.03     9.36    10.11     9.66
                10.19     9.96    10.56     9.13     8.22     7.39     8.15     8.68     7.32     7.85     8.15     8.30
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    28.39   146.04   274.58   354.78   421.17   401.90
               366.70   265.67   136.90    31.64 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 342   SECTOR = 1023
      TEMP =    36.93    37.03    31.93    36.83    36.43    36.13    36.03    35.33    33.93    40.63    42.03    43.63
                44.13    44.53    37.93    44.73    43.63    42.13    41.43    40.53    34.93    39.63    37.73    36.93
      WIND =     7.85     7.77     7.62     8.53     8.00     7.54     6.87     6.41     6.41     7.54     7.77     7.32
                 7.39     8.07     7.85     7.17     7.02     6.87     7.32     6.41     6.64     6.04     5.21     5.88
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    29.05   128.62   249.91   323.78   370.71   334.75
               272.98   224.35   119.16    25.25 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 343   SECTOR = 1026
      TEMP =    36.73    37.63    33.93    37.13    36.43    35.33    34.93    34.53    31.93    38.93    39.53    41.03
                42.03    42.03    36.93    41.13    39.83    38.83    38.43    38.13    33.93    38.43    37.13    36.43
      WIND =     5.66     6.41     5.05     6.87     6.64     6.41     6.87     6.49     7.70     7.62     9.28     9.36
                 9.51    10.19    11.09    10.41    10.26     9.96    10.19     9.43     8.45     8.90     8.83     9.05
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    32.97   131.89   243.64   279.42   335.27   311.90
               268.73   214.67   123.77    31.68 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 344   SECTOR = 1029
      TEMP =    36.13    35.43    29.93    34.43    34.13    33.63    33.13    33.33    29.93    35.83    37.33    37.43
                37.83    38.13    33.93    38.23    37.13    35.63    35.53    35.23    29.93    34.63    34.53    34.63
      WIND =     8.83     8.68     9.88     9.36     9.13     9.13     8.75     8.83     7.85     8.98     9.81     9.36
                 9.58     8.98     8.53     8.37     8.00     7.39     7.47     7.62     6.79     6.71     6.19     6.11
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    22.50   119.75   229.91   325.27   398.73   378.73
               342.94   259.82   136.94    29.51 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 345   SECTOR = 1032
      TEMP =    34.73    34.43    30.93    33.43    34.33    34.93    36.53    36.83    33.93    40.03    42.13    43.53
                43.63    43.63    38.93    44.13    43.63    42.93    41.53    40.73    35.93    40.63    40.13    39.63
      WIND =     5.81     6.41     3.85     6.49     7.02     6.79     6.64     6.56     4.98     7.32     8.30     8.30
                 8.60     9.05     9.96     9.73     9.66     9.96     9.58     8.90     9.73     8.53     8.68     9.13
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    17.92    80.09   173.97   189.91   206.45   198.83
               167.14   135.79    80.87    14.93 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 346   SECTOR = 1035
      TEMP =    39.93    39.33    33.93    37.43    37.23    37.03    36.53    36.83    31.93    38.23    38.73    39.53
```

FIGURE 3-3. SAMPLE PROFILE PROGRAM OUTPUT (Sheet 2 of 6)

```
                37.83   37.63   33.93   39.13   38.13   36.83   36.93   36.83   31.93   35.83   34.73   34.63
      WIND =    10.56    9.81   10.79   10.49   10.34   10.26   10.19   10.64   11.39   10.71   10.79   11.02
                10.19    9.56   10.34   10.64    9.73    8.83    8.98    8.90   10.11    8.90    9.73    8.98
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   14.89   76.86  162.38  249.62  281.01  248.73
              200.60  136.52   83.96   35.55 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 347   SECTOR = 1038
      TEMP =    34.53   33.93   28.93   33.93   33.63   33.13   33.03   33.03   27.93   34.43   35.93   36.93
                37.43   37.73   30.83   36.83   36.53   35.13   34.93   34.13   29.93   34.63   34.83   34.73
      WIND =    9.36    8.90    8.98    8.37    8.60    8.83    9.28    8.22    9.88    8.15    8.75    9.28
                8.83    8.55   11.17    8.83    8.53    8.00    8.37    8.37    8.53    7.39    7.77    7.62
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   20.94  101.14  260.21  334.03  363.73  420.91
              304.59  247.23  188.51   34.37 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 348   SECTOR = 1041
      TEMP =    34.93   34.83   29.93   35.13   34.13   33.93   34.43   34.13   30.93   36.33   37.33   37.63
                38.23   38.23   32.93   38.03   37.03   35.93   36.23   36.73   32.93   35.43   34.93   34.73
      WIND =    7.39    6.15    9.13    8.90    8.83    8.30    8.22    8.53    6.04    8.90    9.58    8.75
                8.60    9.05   10.41    8.22    7.77    7.32    7.77    7.09    7.17    6.41    6.94    6.87
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   27.88  148.82  227.24  284.50  276.05  292.00
              259.22  191.16   98.72   25.15 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 349   SECTOR = 1044
      TEMP =    34.13   33.53   28.93   32.93   32.33   31.73   31.63   31.33   27.93   34.53   35.93   36.33
                36.93   37.43   32.93   37.43   36.83   34.53   32.63   31.93   27.93   32.73   32.33   32.53
      WIND =    6.64    5.88    7.39    6.64    6.71    7.17    7.02    7.09    6.49    8.00    7.77    7.54
                7.70    7.39    7.32    7.02    6.94    6.64    5.96    5.81    4.07    6.64    7.62    7.24
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   20.23  125.83  230.09  301.29  336.40  327.31
              297.11  222.61  124.40   29.80 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 350   SECTOR = 1047
      TEMP =    32.93   32.33   28.93   32.13   32.13   31.73   31.13   31.03   28.93   33.33   34.73   36.13
                36.93   36.23   33.93   38.03   37.13   35.23   33.73   34.93   30.93   35.63   35.93   35.93
      WIND =    7.62    7.54    7.02    6.64    6.87    6.94    7.09    7.62    6.49    8.15    8.30    8.60
                7.92    7.92    7.09    7.09    6.79    6.41    6.94    7.39    5.73    6.71    6.34    6.04
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   30.60   68.88  169.05  283.74  362.07  403.69
              383.19  311.19  197.12   86.44   23.04 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 351   SECTOR = 1050
      TEMP =    34.93   35.03   29.93   33.93   33.23   32.73   33.93   33.63   27.93   35.43   37.03   39.53
                41.43   42.23   37.93   43.23   41.53   39.73   40.03   39.53   34.93   38.43   38.43   38.33
      WIND =    6.49    6.26    6.04    5.51    5.81    5.88    5.81    6.04    6.49    5.21    5.36    6.11
                5.81    5.66    5.21    6.87    6.64    6.04    6.34    6.26    5.36    6.34    6.11    5.96
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   31.49   58.10  152.38  266.36  329.52  357.94
              355.30  293.38  211.50   87.33   24.06 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 352   SECTOR = 1053
      TEMP =    38.63   38.33   33.93   37.53   38.33   38.03   37.73   37.53   34.93   42.63   42.43   43.03
                43.33   42.83   35.93   41.43   40.93   39.73   38.63   38.33   32.93   38.13   38.13   37.13
      WIND =    5.43    4.98    3.55    5.36    5.73    5.88    5.81    5.58    4.22    6.41    8.07    7.70
                6.00    8.07    8.68    8.37    8.83    8.45    8.90    8.60    9.28    7.39    7.70    7.92
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00   16.93   47.43  123.57  190.11  261.99  256.55
              221.89  234.99  168.16   83.32   25.21 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 353   SECTOR = 1056
      TEMP =    36.03   35.73   30.93   33.53   33.43   33.33   32.93   33.03   29.93   36.33   37.73   39.53
                40.33   41.33   36.93   41.53   40.43   38.03   36.73   36.63   30.93   37.53   38.83   39.13
```

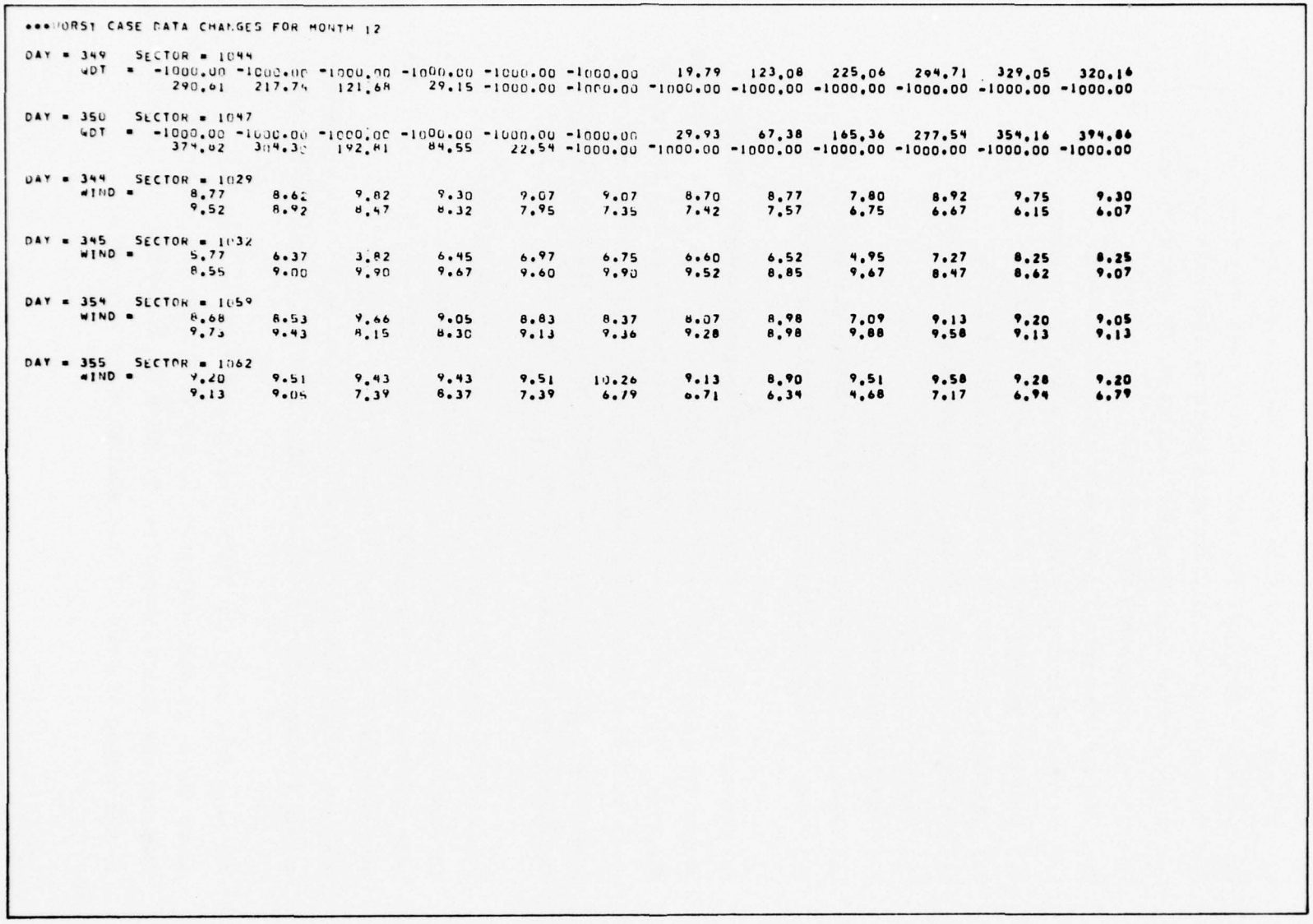
FIGURE 3-3. SAMPLE PROFILE PROGRAM OUTPUT (Sheet 3 of 6)

```
      WIND =      7.47     8.45     5.81     7.92     7.92     7.85     8.37     7.39     6.04     8.00     8.90     8.45
                  8.30     8.00     9.28     8.53     9.36     8.15     8.30     8.45     7.92     8.53     8.45     8.15
      QDT  =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    16.34    51.06   161.83   260.75   347.72   381.85
               337.64   293.88   200.41    99.91    36.83 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 354   SECTOR = 1059
      TEMP =     39.03    39.33    34.93    38.43    38.43    38.33    37.63    37.13    33.93    38.53    38.83    39.53
                 39.83    39.93    35.93    39.23    37.13    35.63    35.73    35.43    30.93    35.93    35.93    36.13
      WIND =      8.68     8.53     9.66     9.05     8.83     8.37     8.07     8.98     7.09     9.13     9.20     9.05
                  9.73     9.43     8.15     8.30     9.13     9.36     9.28     8.98     9.88     9.58     9.13     9.13
      QDT  =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    10.04    49.57   159.51   265.78   340.53   332.52
               330.61   281.04   195.94    92.79    30.83 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 355   SECTOR = 1062
      TEMP =     35.63    34.63    29.93    34.83    34.63    34.73    34.23    33.83    29.93    35.53    36.63    37.63
                 37.83    37.53    32.93    37.33    36.53    35.13    34.53    34.73    29.93    32.63    32.23    31.83
      WIND =      9.20     9.51     9.43     9.43     9.51    10.26     9.13     8.90     9.51     9.58     9.28     9.20
                  9.13     9.05     7.39     8.37     7.39     6.79     6.71     6.34     4.68     7.17     6.94     6.79
      QDT  =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    19.31    42.68   116.05   178.35   192.10   191.98
               173.90   158.07   118.52    41.37    10.47 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 356   SECTOR = 1065
      TEMP =     31.53    31.43    25.93    29.63    29.23    29.43    30.13    30.13    27.93    32.63    33.73    34.63
                 36.23    35.93    29.93    35.53    34.73    32.73    31.33    30.73    26.93    30.13    30.93    30.93
      WIND =      6.11     7.17     5.28     6.94     6.71     6.41     6.94     6.79     3.85     6.79     7.09     7.24
                  8.00     8.00     8.83     7.47     6.87     5.28     5.73     5.73     3.24     4.90     5.43     5.13
      QDT  =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    24.65    77.02   184.85   286.15   349.72   382.20
               328.94   279.26   205.14   101.41    27.12 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 357   SECTOR = 1068
      TEMP =     31.73    32.43    30.93    33.03    33.13    32.43    33.13    32.63    29.93    38.33    40.03    43.03
                 44.33    45.13    41.93    44.33    44.53    42.83    42.83    42.03    37.93    40.23    39.43    39.83
      WIND =      5.51     5.81     2.41     5.21     5.81     5.28     5.43     5.43     5.58     6.56     6.49     8.83
                  9.13     9.28     8.68     8.07     8.07     7.32     8.22     7.92     5.73     6.79     6.11     7.02
      QDT  =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    28.07    52.08   156.94   274.77   327.94   341.08
               317.94   235.48   175.75    88.72    26.10 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 358   SECTOR = 1071
      TEMP =     40.13    41.03    35.93    39.73    38.63    37.63    38.43    38.43    33.93    40.03    41.33    41.93
                 42.53    43.03    38.93    41.53    40.53    39.13    38.03    38.13    34.93    38.93    38.43    38.43
      WIND =      7.92     7.85     6.04     6.87     6.26     6.79     7.02     6.34     6.87     6.87     8.00     8.45
                  8.53     8.45     7.92     8.15     8.60     8.45     7.92     7.70     8.07     8.30     9.66     9.43
      QDT  =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    12.18    34.75   104.07   184.17   209.75   269.72
               304.97   307.74   209.31   112.06    32.53 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 359   SECTOR = 1074
      TEMP =     37.93    37.33    31.93    36.93    37.03    36.53    36.33    35.73    29.93    38.73    39.93    40.33
                 41.43    41.73    38.93    42.63    41.33    38.03    36.93    35.83    31.93    35.23    35.43    35.43
      WIND =      9.28     9.51    10.49     9.96     9.66     9.73     9.66     9.20     9.66     9.73     9.51     9.13
                  9.05     8.83     8.90     7.92     7.17     7.09     7.09     6.79     5.66     6.94     7.17     7.24
      QDT  =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    26.14    77.02   186.14   299.64   365.59   404.02
               360.46   294.97   213.38    97.63    32.08 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 360   SECTOR = 1077
      TEMP =     34.93    33.93    28.93    34.23    34.43    33.83    33.93    33.23    29.93    37.23    39.23    41.23
                 42.43    42.83    38.93    43.23    42.03    39.83    38.73    38.93    32.93    33.53    38.03    37.93
      WIND =      7.02     6.41     7.70     7.70     7.24     7.47     7.32     6.41     6.11     8.37     9.13     9.13
```

FIGURE 3-3. SAMPLE PROFILE PROGRAM OUTPUT (Sheet 4 of 6)

```
                 9.20     9.51     8.37     8.37     7.92     7.77     7.17     7.77     8.98     6.56     7.85     8.15
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    20.50    48.66   138.93   230.21   310.31   341.80
              331.01   305.07   235.66   118.42    29.23 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 361   SECTOR = 1080
      TEMP =    37.73    37.43    32.93    37.73    37.13    36.83    36.43    35.63    31.93    39.33    40.43    41.23
                42.83    43.03    38.93    41.93    41.53    39.93    38.53    38.53    33.93    38.23    37.53    37.33
      WIND =     7.54     7.32     8.00     7.02     7.17     6.94     7.39     7.39     6.56     8.00     8.53     8.15
                 8.53     8.07     6.26     7.62     7.85     7.17     7.09     6.71     6.34     7.39     7.17     7.54
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    36.24    66.64   176.05   266.72   343.18   391.03
              388.54   323.09   187.76    93.30    29.41 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 362   SECTOR = 1083
      TEMP =    37.63    37.73    32.93    38.03    37.63    37.73    37.53    37.53    32.93    40.93    42.13    43.13
                43.23    43.63    37.93    41.43    40.73    39.83    39.13    39.33    35.93    40.13    39.53    38.93
      WIND =     7.70     7.47     7.47     6.87     6.94     8.30     7.70     7.77     8.83     8.60     9.13     9.43
                 9.88    10.49    10.26    10.41    10.19    10.26    10.56     9.96    10.41    10.03     9.96     9.05
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    33.86    50.44   113.98   196.23   251.92   257.18
              244.71   182.77   130.37    60.33    16.49 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 363   SECTOR = 1086
      TEMP =    38.73    38.23    33.93    37.83    37.23    36.73    36.33    35.93    31.93    37.03    36.93    37.53
                37.23    37.73    33.93    38.53    37.63    36.33    35.13    34.93    27.93    33.73    32.93    31.73
      WIND =     8.15     8.07     6.71     8.07     7.54     7.47     8.30     7.92     7.92     8.07     8.37     8.00
                 8.07     8.83     9.66     9.73     8.68     8.45     8.53     8.22     9.81     7.92     8.60     9.20
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    19.61    55.52   131.53   187.83   190.70   199.61
              230.80   221.30   170.01    87.53    22.87 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 364   SECTOR = 1089
      TEMP =    31.33    32.13    27.93    32.63    32.53    31.13    30.53    30.13    26.93    32.83    33.73    34.83
                35.33    35.43    30.93    35.13    34.73    33.23    33.13    32.63    26.93    32.13    32.03    32.73
      WIND =     8.30     8.83     8.83     8.75     8.68     8.75     6.30     8.37     8.22     8.90     9.51     9.58
                10.41    11.17    10.79    10.11     9.51     9.13     6.75     7.92     8.90     8.30     8.37     8.98
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    15.15    47.53   154.36   255.26   335.86   352.40
              335.36   266.25   184.47   104.96    29.59 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 365   SECTOR = 1092
      TEMP =    32.63    32.73    28.93    32.53    32.53    32.23    31.53    31.23    26.93    34.43    36.33    36.63
                36.83    37.63    32.93    37.33    36.73    34.93    34.13    35.13    31.93    35.13    35.33    35.33
      WIND =     9.66     9.96     8.98    10.79    10.64    10.64     9.96     9.66     9.58     9.81    10.34     9.73
                10.79    11.02    10.94    10.11     9.43     8.75     8.30     8.45     6.04     8.60     8.53     8.90
      QDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    24.95    73.74   187.81   301.50   379.43   417.65
              374.08   315.17   211.89   108.72    30.15 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00
```

FIGURE 3-3. SAMPLE PROFILE PROGRAM OUTPUT (Sheet 5 of 6)



```
***WORST CASE DATA CHANGES FOR MONTH 12

DAY = 349   SECTOR = 1044
     WDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    19.79   123.08   225.06   294.71   329.05   320.16
             290.61   217.74   121.68    29.15 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 350   SECTOR = 1047
     WDT =  -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00    29.93    67.38   165.36   277.54   354.16   394.86
             374.82   304.38   192.81    84.55    22.54 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00 -1000.00

DAY = 344   SECTOR = 1029
    WIND =     8.77     8.62     9.82     9.30     9.07     9.07     8.70     8.77     7.80     8.92     9.75     9.30
               9.52     8.92     8.47     8.32     7.95     7.35     7.42     7.57     6.75     6.67     6.15     6.07

DAY = 345   SECTOR = 1032
    WIND =     5.77     6.37     3.82     6.45     6.97     6.75     6.60     6.52     4.95     7.27     8.25     8.25
               8.55     9.00     9.90     9.67     9.60     9.90     9.52     8.85     9.67     8.47     8.62     9.07

DAY = 354   SECTOR = 1059
    WIND =     8.68     8.53     9.66     9.05     8.83     8.37     8.07     8.98     7.09     9.13     9.20     9.05
               9.73     9.43     8.15     8.30     9.13     9.36     9.28     8.98     9.88     9.58     9.13     9.13

DAY = 355   SECTOR = 1062
    WIND =     9.20     9.51     9.43     9.43     9.51    10.26     9.13     8.90     9.51     9.58     9.28     9.20
               9.13     9.05     7.39     8.37     7.39     6.79     8.71     6.34     4.68     7.17     6.94     6.79
```

FIGURE 3-3 SAMPLE PROFILE PROGRAM OUTPUT (Sheet 6 of 6)

3a) Average wind velocity for each day of one year.
3b) Average solar insolation for each day of one year.
4a) Average temperature for each month of each data year.
4b) Average wind velocity for each month of each data year.
4c) Average solar insolation for each month of each data year.
5a) Average temperature for each month of one year.
5b) Average wind velocity for each month of one year.
5c) Average solar insolation for each month of one year.
6a) Standard deviation of statistics gathered in 4a.
6b) Standard deviation of statistics gathered in 4b.
6c) Standard deviation of statistics gathered in 4c.
7a) Minimum temperature for each year.
7b) Maximum temperature for each year.
8a) Mean and standard deviation of statistics gathered in 7a.
8b) Mean and standard deviation of statistics gathered in 7b.

For statistics 1a, 1b, and 1c the STATS program averages the MERGE values stored for a given hour, day, and month over all data years contained in the file. The total number of values computed and stored for 1a, 1b, or 1c is thus 24 x 365 = 8760, giving one complete year of average hourly temperature, wind velocity, and solar insolation values. This constitutes the bulk of the STATS file content.

These hourly averages can be used to give a reasonable weather profile for any hour of a sample year. However, using mean values for an entire year produces an uncharacteristically mild profile (a mean year) with an extremely small likelihood of occurrence. Statistics 2a through 8b, as described below, are therefore gathered to allow the user to scale the hourly average values up or down (Section 3.4 discusses this scaling).

For each data year, the STATS program averages the 24 hourly values for a given day to produce statistics 2a and 2b. The total number of values computed and stored, therefore, is 365 x Y_{ℓ} for each statistic (where Y_{ℓ} is the number of years of data available for location ℓ).

The STATS program then averages the Y_ℓ values of 2a or 2b to get statistics 3a and 3b, respectively, for each day of the year. Thus, the total number of values stored for each of these statistics is 365.

For statistics 4a, 4b, and 4c, averages of all hourly temperature, wind velocity, and solar insolation values, respectively, are computed corresponding to a given month of each data year. The total number of stored values for each of the 4a, 4b, or 4c statistics is, therefore, $12 \times Y_\ell$.

The program averages the Y_ℓ values of 4a, 4b, or 4c to generate statistics 5a, 5b, or 5c, respectively, and computes the standard deviation (6a, 6b, or 6c) of the Y_ℓ values corresponding to each month of the year. Hence, the total number of values stored for each of these six statistics is 12.

Statistics 7a and 7b are simply the minimum and maximum temperatures observed at a location during a given data year. Thus, there are Y_ℓ values of each of these statistics.

Finally, the program computes the means and standard deviations of the Y_ℓ values of 7a or 7b to yield statistics 8a or 8b, respectively. Each of the 8a and 8b statistics has, therefore, only two stored values.

The mathematical formulas for the above statistics are provided in Appendix A. A flow diagram of the STATS program is shown in Figure 3-4.

3.4 PROFILE Program

The PROFILE program uses the one year of statistically prepared STATS data to produce a modified statistical file for use with the DSPA program. The procedure involves the scaling of the STATS file data on a monthly basis by factors computed from user-specified proportions and confidence levels. In addition, the PROFILE program will, upon request, perform a worst case analysis for low solar insolation, low wind, or high wind periods. The exact type and use of these input requests and their results

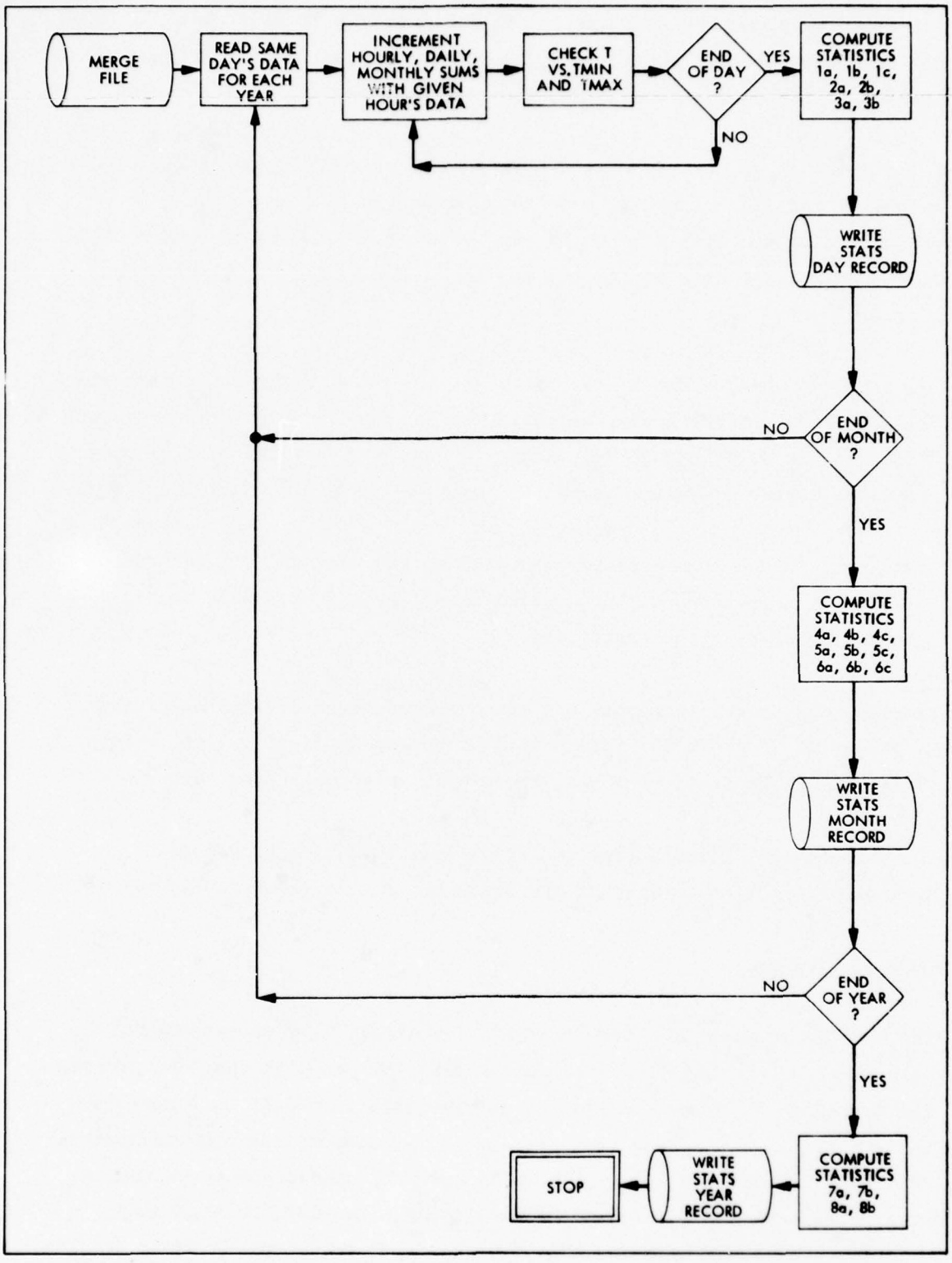


FIGURE 3-4. STATS COMPUTER PROGRAM

are discussed below. The revised weather data is written onto a STAT file for subsequent use as input to the DSPA program.

1) Low or High Temperature Months

In constructing the hour-by-hour profile year for temperature, the following options are available for each month:

a) Use the average hourly values for temperature directly from the STATS file.

b) Construct a month for which the temperatures are low, in the sense described below, at a user-specified confidence level.

c) Construct a month for which the temperatures are high, in the sense described below, at a user-specified confidence level.

A low temperature month is defined as one having an average temperature $C^{low}_{\ell m,\ temp.}$ such that 100P% of all actual monthly average temperatures can be expected to exceed $C^{low}_{\ell m,\ temp.}$ at a 100α% confidence level. The proportion P and the confidence level α are input by the user. The PROFILE program calculates $C^{low}_{\ell m,\ temp.}$ using P, α, the monthly temperature average for each year of data (statistic 4a of Section 3.3) and the mean and standard deviation of these values (5a and 6a of Section 3.3). The difference, $D^{low}_{\ell m,\ temp.} = \bar{\bar{T}}_{\ell m} - C^{low}_{\ell m,\ temp.}$, is used to scale down all hourly temperature values for the month.

Similarly a high temperature month is defined as one having an average temperature $C^{high}_{\ell m,temp.}$ such that 100P% of all actual monthly temperatures can be expected to fall below $C^{high}_{\ell m,temp.}$ with 100α% confidence, and the difference, $D^{high}_{\ell\ ,temp} = \bar{\bar{T}}_{\ell m'} - C^{high}_{\ell m,temp.}$, is used to increase each hourly temperature value for the month.

2) Low or High Solar Insolation Month

The options and descriptions of the low or high solar insolation construction are exactly analogous to those for temperature above, except that, since solar insolation is on a ratio scale (i.e., has

a naturally occurring zero point and equal interval measurements), a multiplicative scaling factor is more appropriate than the difference technique applied to temperature scaling. Hence, $R^{low}_{\ell m,\ insol.} = C^{low}_{\ell m,\ insol.} / \bar{\bar{Q}}_{\ell m}$ and $R^{high}_{\ell m,\ insol.} = C^{high}_{\ell m,\ insol.} / \bar{\bar{Q}}_{\ell m}$, where $\bar{\bar{Q}}_{\ell m}$ is the observed monthly solar insolation (statistic 5c in Section 3.3).

3) Low or High Wind Velocity Month

The explanations and computations involved in scaling the hourly values of wind velocity to produce a low or high month are the same as those for solar insolation. The scaling ratios $R^{low}_{\ell m,\ wind\ vel.}$ and $R^{high}_{\ell m,\ wind\ vel.}$ are used to lower or raise, respectively, the hourly wind velocity observations.

4) Period of Low Solar Insolation

In addition to producing uniformly low or high or mean solar insolation values for any given month, the PROFILE program also provides an option for creating a string of "worst case" days for which the daily insolation values fall below some user-specified fraction of the observed average for that day. The fraction P and probability of occurrence α are input by the user for each month.

For each month, in which a low period is requested, the PROFILE program compares the daily average for a given day of each data year (statistic 2a of Section 3.3) with the average over all years (statistic 3a). If the average for a particular day is less than 100P% of the average for the same day over all remaining years, then the day is classified as "low"; otherwise, the day is termed "normal."

A pattern of "low" and "normal" days is thus created for a given month for all data years. The lengths ($B^{i}_{\ell m}$) and the number of occurrences (n) of strings of "low" days are considered as realizations of a random variable having a Poisson type distribution (rare event). The PROFILE program uses the patterns of these "low" strings

to determine the average number of consecutive "worst case" days ($\overline{B}_{\ell m}$). The value of $\overline{B}_{\ell m}$, as discussed in Appendix B, is a justifiable approximation to the true Poisson maximum likelihood estimate, λ. From the value of $\overline{B}_{\ell m}$ (hereafter referred to as λ) and the user-specified confidence level α, the program computes a string length N such that the probability of N or fewer "low" days in a row is α.

This N-day string is centered about the 15th day of the month, and the hourly solar insolation values for each of these days is scaled down by the factor P. It is, of course, possible that a user-defined "low" day may be higher than the same day's values in the low solar insolation month generated by item 2 above. In such cases, the PROFILE program will select the minimum of the two computed values.

The number of sequential "low" days generated is directly determined by the values of α and λ. To assist the user in planning "worst case" insolation analyses, Appendix D contains a table of the number of "low" days as a function of α and λ. The value of λ is dependent on the particular station, month of the year, and user-input fraction P. Appendix C gives, for each station (see Table 1-1 for a cross reference to station location and station number), a table of λ (actually $\overline{B}_{\ell m}$) as a function of the month and P. Hence, the user may select a P and an α for a particular station and month and determine the resultant PROFILE program λ from Appendix C, and subsequently, the resultant number of sequential "low" days from Appendix D. The user may then vary either P (to get a different λ) or α to obtain a more desirable "low" string length.

Note that the largest value of λ found is 8.235 for P = 1.00 for month 7 of location 93193. Using this value for illustrative purposes, Appendix D indicates that a string of 13 "low" solar insolation days will occur for α = 0.93 (93%). However, a P of 1.00 is really somewhat useless for a "worst case" since all values

would remain as 100% of the original averages. More reasonably, for $P < 1.00$, the value of λ will be less than 2.0 yielding "low" strings of fewer than 6 days for $\alpha < 0.99$ (99%). In any case, with the aid of Appendix C and Appendix D, the user can predetermine the results of his "worst case" analysis.

5) Period of Low or High Wind Velocity

As in the case of low solar insolation periods (item 4 above), a low or high wind velocity day is defined as one in which the average daily wind velocity is less than $100P_1$% or greater than $100P_2$% of the daily average for the same day over all years. The PROFILE program fits a Poisson distribution to the strings of low days and of high days. The user-input occurrence probabilities, α_1, and α_2, are then used to determine the number of sequential "low" days, N_1, and the number of sequential "high" days, N_2, in the same manner described for low insolation periods above.

The N_1 "low" days are centered around the 10th day of the month, and the N_2 high days are centered about the 20th day. The "low" days are then scaled down by the factor P_1, and the "high" days are scaled up by the factor P_2 (> 1.00). The remaining days of the month may be taken from the mean year data or from low or high month values.

The mathematical formulas used for all of the above PROFILE computations are provided in Appendix B. A flow diagram of the PROFILE program is provided in Figure 3-5.

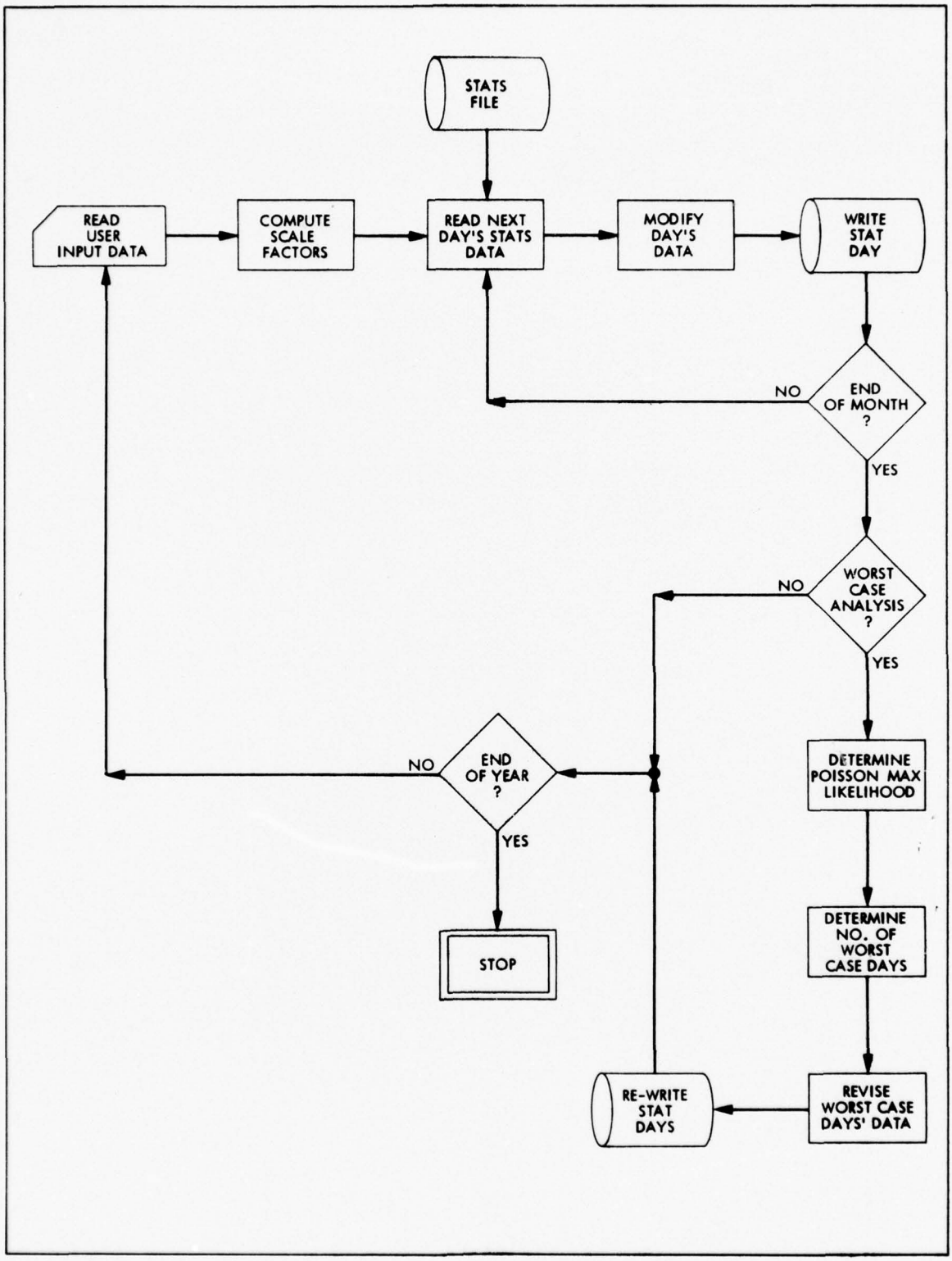


FIGURE 3-5. PROFILE COMPUTER PROGRAM

4. REFERENCES

(1) "Surface Observations; TDF-14," National Oceanic and Atmospheric Administration, Asheville, North Carolina, October 1975.

(2) "Solar Radiation - Hourly: DECK-280," National Oceanic and Atmospheric Administration, Asheville, North Carolina, April 1967.

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(5) Applied General Statistics, Second Edition, Croxton, F.E. and Cowden, D.J., Prentice-Hall, New Jersey, 1955.

(6) "Determining Appropriate Statistical Analysis", Clark, V. et al., unpublished notes, UCLA, 1974.

(7) The Advanced Theory of Statistics, Volume 2, Third Edition, Kendall, M.G. and Stuart, A., Hafner, New York, 1967.

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APPENDIX A

STATS PROGRAM MATHEMATICAL FORMULAS

Input (from Merge Tape):

T_{lmdhy}, V_{lmdhy}, Q_{lmdhy} = Temperature, wind velocity, solar insolation for location l, month m, day d, hour h, year y

Y_{lm} = Number of years of data for month m, at location l

D_m = Number of days in month m

Y_l = Total number of years of data at location l

Statistic		Formula
1a) $\overline{T}_{lmdh}$	=	$\sum_y T_{lmdhy}/Y_{lm}$
1b) $\overline{V}_{lmdhy}$	=	$\sum_y V_{lmdhy}/Y_{lm}$
1c) $\overline{Q}_{lmdh}$	=	$\sum_y Q_{lmdhy}/Y_{lm}$
2a) $\overline{V}_{lmdy}$	=	$\sum_y V_{lmdhy}/24$
2b) $\overline{Q}_{lmdy}$	=	$\sum_y Q_{lmdhy}/24$
3a) $\overline{\overline{V}}_{lmd}$	=	$\sum_y \overline{V}_{lmdy}/Y_{lm}$
3b) $\overline{\overline{Q}}_{lmd}$	=	$\sum_y \overline{Q}_{lmdy}/Y_{lm}$
4a) $\overline{T}_{lmy}$	=	$\sum_d \sum_h T_{lmdhy}/24D_m$
4b) $\overline{V}_{lmy}$	=	$\sum_d \sum_h V_{lmdhy}/24D_m$
4c) $\overline{Q}_{lmy}$	=	$\sum_d \sum_h Q_{lmdhy}/24D_m$

Statistic			Formula
5a)	$\overline{\overline{T}}_{lm}$	=	$\sum_y \overline{T}_{lm}/Y_{lm}$
5b)	$\overline{\overline{V}}_{lm}$	=	$\sum_y \overline{V}_{lm}/Y_{lm}$
5c)	$\overline{\overline{Q}}_{lm}$	=	$\sum_y \overline{Q}_{lm}/Y_{lm}$
6a)	ST_{lm}	=	$\left[\left(\sum_y \overline{T}_{lmy}^{\,2} - Y_{lm}\,\overline{\overline{T}}_{lm}^{\,2}\right)/(Y_{lm} - 1)\right]^{1/2}$
6b)	SV_{lm}	=	$\left[\left(\sum_y \overline{V}_{lmy}^{\,2} - Y_{lm}\,\overline{\overline{V}}_{lm}^{\,2}\right)/(Y_{lm} - 1)\right]^{1/2}$
6c)	SQ_{lm}	=	$\left[\left(\sum_y \overline{Q}_{lmy}^{\,2} - Y_{lm}\,\overline{\overline{Q}}_{lm}^{\,2}\right)/(Y_{lm} - 1)\right]^{1/2}$
7a)	$T_{max,ly}$	=	$\min_{m,d,h} \{T_{lmdhy}\}$
7b)	$T_{min,ly}$	=	$\max_{m,d,h} \{T_{lmdhy}\}$
8a)	$\overline{T}_{max,l}$	=	$\sum_y T_{max,ly}/Y_l$
	$ST_{max,l}$	=	$\left[\left(\sum_y T_{max,ly}^{\,2} - Y_l\,\overline{T}_{max,l}^{\,2}\right)/(Y_l - 1)\right]^{1/2}$
8b)	$\overline{T}_{min,l}$	=	$\sum_y T_{min,ly}/Y_l$
	$ST_{min,l}$	=	$\left[\left(\sum_y T_{min,ly}^{\,2} - Y_l\,\overline{T}_{min,l}^{\,2}\right)/(Y_l - 1)\right]^{1/2}$

APPENDIX B

PROFILE PROGRAM MATHEMATICAL FORMULAS

1. Tolerance Limits - Temperature.

Input: α, P, Y_{lm}, $\overline{\overline{T}}_{lm}$, ST_{lmy}

$$z\alpha = \Phi^{-1}(1 - \alpha),\ z_{1-P} = \Phi^{-1}(P)$$

where: $\Phi(x) = \int_{-\infty}^{x} \frac{1}{\sqrt{2\pi}} e^{-t^2/2} dt$

$$a_{lm} = 1 - z_\alpha^2 \Big/ \left[2(Y_{lm} - 1)\right]$$

$$b_{lm} = z_{1-P}^2 - z_\alpha^2 / Y_{lm}$$

$$k_{lm} = \left[z_{1-P} + \sqrt{z_{1-P}^2 - a_{lm}\, b_{lm}}\right] \Big/ a_{lm}$$

$$C_{lm,\ temp.}^{low} = \overline{\overline{T}}_{lm} - k_{lm}\, ST_{lm}$$

$$C_{lm,\ temp.}^{high} = \overline{\overline{T}}_{lm} + k_{lm}\, ST_{lm}$$

2. Tolerance limits - solar insolation.

$$C_{lm,\ insol.}^{low} = \overline{\overline{Q}}_{lm} - k_{lm}\, SQ_{lm}$$

$$C_{lm,\ insol.}^{high} = \overline{\overline{Q}}_{lm} + k_{lm}\, SQ_{lm}$$

3. Tolerance limits - wind velocity.

$$C^{low}_{lm,\ wind\ vel.} = \overline{\overline{V}}_{lm} - k_{lm}\, SV_{lm}$$

$$C^{high}_{lm,\ wind\ vel.} = \overline{\overline{V}}_{lm} + k_{lm}\, SV_{lm}$$

4. Translation Factors for low/high temperature months.

$$D^{low}_{lm,\ temp.} = \overline{\overline{T}}_{lm} - C^{low}_{lm,\ temp.}$$

$$D^{high}_{lm,\ temp.} = \overline{\overline{T}}_{lm} + C^{low}_{lm,\ temp.}$$

5. Scaling Factors for low/high solar insolation months.

$$R^{low}_{lm,\ insol.} = C^{low}_{lm,\ insol.} \Big/ \overline{\overline{Q}}_{lm}$$

$$R^{high}_{lm,\ insol.} = C^{high}_{lm,\ insol.} \Big/ \overline{\overline{Q}}_{lm}$$

6. Scaling Factors for low/high wind velocity months.

$$R^{low}_{lm,\ wind\ vel.} = C^{low}_{lm,\ wind\ vel.} \Big/ \overline{\overline{V}}_{lm}$$

$$R^{high}_{lm,\ wind\ vel.} = C^{high}_{lm,\ wind\ vel.} \Big/ \overline{\overline{V}}_{lm}$$

7. Generation of period of low solar insolation days.

Input: P, α, $\overline{Q}_{\ell mdy}$, $\overline{\overline{Q}}_{\ell md}$

$$X_{\ell m} = \begin{cases} 1 \text{ if } \overline{Q}_{\ell mdy} \leq P \cdot \overline{\overline{Q}}^{*}_{\ell md} \\ 0 \text{ if } \overline{Q}_{\ell mdy} > P \cdot \overline{\overline{Q}}^{*}_{\ell md} \end{cases}$$

where $\overline{\overline{Q}}^{*}_{\ell md}$ is the mean of all $\overline{Q}_{\ell mdy}$ values exlcuding the current one.

A value of $X_{\ell m}$ is recorded for each day of data for month m. Patterns of 0's and 1's are thus observed.

Let $B_{\ell m}$ = n if the pattern 0, 1, 1, ..., 1, 0 is observed, where there are n consecutive 1's. The mean $\overline{B}_{\ell m}$ of all $B_{\ell m}$ values is calculated and used as $\overline{x}$ (in Reference 8) to produce an estimate $\hat{\lambda}$ of the parameter λ in a truncated Poisson distribution.

The truncated Poisson distribution is summed until the cumulative probability level is greater than α, that is, until a value N is produced such that

$$\frac{\sum^{N} \hat{\lambda}^{i}/i!}{\sum^{D_m} \hat{\lambda}^{i}/i!} \leq \alpha$$

and

$$\frac{\sum^{N+1} \hat{\lambda}^{i}/i!}{\sum^{D_m} \hat{\lambda}^{i}/i!} > \alpha$$

The N low solar insolation days are produced having hourly insolation values:

$$\tilde{Q}_{lmdh} = P \cdot \bar{Q}_{lmdh}$$

8. Generation of periods of low/high wind velocity computations are exactly the same as in 7., except that 2 strings are generated, one for low wind velocity days ($P_1 < 1$) and one for high wind velocity days ($P_2 > 1$). N_1 low days having hourly wind velocities:

$$\tilde{V}^{low}_{lmdh} = P_1 \cdot \bar{V}_{lmdh}$$

and N_2 high days having hourly wind velocities:

$$\tilde{V}^{high}_{lmdh} = P_2 \cdot \bar{V}_{lmdh}$$

are then generated.

Distribution Fitting in the PROFILE Program

The Profile program calculates $\bar{B}_{\ell m}$, the average number of consecutive low days observed for location ℓ, month m in all years.

The distribution to be fitted is a right-truncated Poisson with parameter λ. The truncation point is D_m, the number of days in month m. D_m = 28, 30 or 31. The frequency function is

$$f(x;\ \lambda,\ D_m) = K\lambda^x/x! \qquad x = 0,\ \ldots,\ D_m$$

where

$$K = \left[\sum_{y=0}^{D_m} \lambda^y/y!\right]^{-1}$$

In the PROFILE program, we need to calculate the $(1 - \alpha)$ tail of this distribution. We need an integer D^* such that

$$\sum_{x=D^*}^{D_m} f(x; \lambda, D_m) \approx 1 - \alpha$$

To do this, an estimate of the unknown parameter λ is needed. The usual technique of maximum likelihood produces an estimate $\hat{\lambda}$ which is the unique positive real solution to the D_m^{th} degree polynomial equation

$$\sum_{y=0}^{D_m} \left(\frac{\overline{B}_{\ell m} - y}{y!} \right) \hat{\lambda}^y = 0 \ . \qquad (1)$$

Reference 8 shows that when $\overline{B}_{\ell m}$ itself, rather than the maximum likelihood estimate $\hat{\lambda}$, is used to estimate λ, the error is negligible for values of D_m and $\overline{B}_{\ell m}$ encountered in the PROFILE program. For derivation of equation (1) and more details on accuracy of $\overline{B}_{\ell m}$ as an estimate, see Reference 8.

APPENDIX C

LAMBDA VALUES FOR WORST CASE ANALYSES

TABLE OF LAMBDA VALUES FOR STATION 12639

PLG	1	MONTH 01	MONTH 02	MONTH 03	MONTH 04	MONTH 05	MONTH 06	MONTH 07	MONTH 08	MONTH 09	MONTH 10	MONTH 11	MONTH 12
.00	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.10	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.20	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.30	1	.125000	.000000	.166667	.000000	.000000	.500000	.000000	.000000	.166667	.250000	.000000	.200000
.40	1	.214286	.142857	.200000	.500000	.200000	.428571	.000000	.000000	.625000	.125000	.333333	.222222
.50	1	.300000	.166667	.157895	.400000	.150000	.500000	.181818	.333333	.818182	.111111	.214286	.214286
.60	1	.280000	.315789	.260870	.181818	.375000	.578947	.500000	.411765	.434783	.160000	.363636	.217391
.70	1	.425000	.266667	.500000	.304348	.531250	.689655	.423077	.708333	.628571	.222222	.533333	.424242
.80	1	.652174	.384615	.487805	.454545	.971429	.921053	.657895	.500000	.833333	.477273	.642857	.750000
.90	1	.867925	.829787	.735849	.541667	1.279070	1.390244	1.000000	.877193	1.117647	.566667	.732143	1.086957
1.00	1	1.186441	1.103448	1.299508	1.177419	1.775510	1.687500	1.527273	1.500000	1.456140	.821918	1.181818	1.283333

TABLE OF LAMBDA VALUES FOR STATION 12919

PLG	1	MONTH 01	MONTH 02	MONTH 03	MONTH 04	MONTH 05	MONTH 06	MONTH 07	MONTH 08	MONTH 09	MONTH 10	MONTH 11	MONTH 12
.00	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.10	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.20	1	.000000	.000000	.250000	1.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.222222
.30	1	.600000	.454545	.625000	.166667	.666667	.000000	1.000000	.000000	.666667	.000000	.200000	.909091
.40	1	.636364	.600000	.636364	.357143	1.000000	.250000	.500000	.250000	.285714	.300000	.263158	.619048
.50	1	.960000	.650000	.555556	.421053	.666667	.428571	.285714	.272727	.875000	.230769	.684211	.833333
.60	1	.900000	.629630	.500000	.400000	.416667	.777778	.444444	.375000	.700000	.333333	.708333	.793103
.70	1	.916667	.727273	.529412	.807692	.450000	.571429	.454545	.650000	.625000	.541667	.800000	1.000000
.80	1	1.166667	.970588	.800000	1.178571	.689655	.500000	.555556	.916667	.520000	.689655	1.156250	1.142857
.90	1	1.486486	1.212121	1.000000	1.281250	1.064516	.785714	.733333	1.206897	.806452	.939394	1.558824	1.315789
1.00	1	1.805556	1.542857	1.657895	1.384615	1.875000	2.100000	1.852941	2.000000	1.166667	1.275000	2.088235	1.292683

TABLE OF LAMBDA VALUES FOR STATION 13745

PLG	1	MONTH 01	MONTH 02	MONTH 03	MONTH 04	MONTH 05	MONTH 06	MONTH 07	MONTH 08	MONTH 09	MONTH 10	MONTH 11	MONTH 12
.00	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.10	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	1.000000	.000000
.20	1	.105263	.000000	.000000	.000000	.000000	.000000	.000000	.166667	.000000	.000000	.090909	.000000
.30	1	.300000	.000000	.055556	.000000	.000000	.117647	.000000	.100000	.066667	.157895	.235294	.076923
.40	1	.307692	.000000	.074074	.050000	.071429	.260870	.200000	.117647	.285714	.259	.318182	.187500
.50	1	.386364	.217391	.285714	.161290	.173913	.625000	.142857	.190476	.500000	.277	266667	.256410
.60	1	.400000	.392157	.348837	.289474	.343750	.642857	.142857	.333333	.500000	.513	32932	.365854
.70	1	.549020	.537037	.511111	.311111	.394737	.617647	.205882	.588235	.540541	.547	.511111	.489362
.80	1	.566038	.616667	.591837	.388889	.448980	.707317	.571429	.780488	.651	.837209	.660000	.563636
.90	1	.553846	.600000	.583333	.545455	.607143	.829787	.777778	1.000000	.750000	1.065217	.785714	.682540
1.00	1	.805970	.738462	.796875	.725806	.901639	.918033	1.163636	.875000	1.018182	1.347826	.983333	.769231

TABLE OF LAMBDA VALUES FOR STATION 14607

PLQ	I	MONTH 01	MONTH 02	MONTH 03	MONTH 04	MONTH 05	MONTH 06	MONTH 07	MONTH 08	MONTH 09	MONTH 10	MONTH 11	MONTH 12
.00	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.10	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.20	1	.000000	.000000	.333333	.000000	.000000	.222222	.125000	.000000	.062500	.166667	.047619	.000000
.30	1	.083333	.166667	.090909	.071429	.391304	.250000	.411765	.150000	.064516	.272727	.156250	.071429
.40	1	.260870	.294118	.050000	.162162	.548387	.242424	.307692	.192308	.125000	.340909	.390244	.400000
.50	1	.352941	.360000	.133333	.166667	.657143	.348837	.242424	.186047	.304348	.461538	.673469	.487179
.60	1	.346939	.485714	.243902	.272727	.622222	.416667	.365854	.288462	.411765	.543860	.714286	.468085
.70	1	.491525	.565217	.384615	.413793	.618182	.611111	.440000	.396552	.553571	.569231	.883333	.784314
.80	1	.621212	.711538	.745455	.555556	.836066	.945455	.666667	.532258	.616667	.695652	1.032258	.864407
.90	1	.928571	.931034	.825397	.833333	1.064516	.893939	.965517	.703125	.642857	.970588	1.106061	1.049180
1.00	1	1.231884	1.078125	1.084507	1.215385	1.387097	1.058824	1.142857	.869565	.710526	1.086957	1.289855	1.426230

TABLE OF LAMBDA VALUES FOR STATION 14732

PLQ	I	MONTH 01	MONTH 02	MONTH 03	MONTH 04	MONTH 05	MONTH 06	MONTH 07	MONTH 08	MONTH 09	MONTH 10	MONTH 11	MONTH 12
.00	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.10	1	.000000	.000000	.000000	.166667	.000000	.000000	.000000	.000000	.000000	.250000	.000000	.000000
.20	1	.466667	.071429	.312500	.153846	.307692	.000000	.333333	.000000	.285714	.307692	.133333	.133333
.30	1	.541667	.125000	.347826	.400000	.428571	.125000	.250000	.166667	.300000	.315789	.142857	.318182
.40	1	.653846	.133333	.357143	.400000	.588235	.100000	.363636	.277778	.375000	.409091	.192308	.478261
.50	1	.687500	.176471	.533333	.571429	.521739	.166667	.416667	.400000	.529412	.500000	.400000	.424242
.60	1	.714286	.250000	.645161	.545455	.560000	.238095	.352941	.360000	.434783	.640000	.441176	.583333
.70	1	.666667	.405405	.774194	.575758	.625000	.480000	.384615	.433333	.518519	.730769	.486486	.500000
.80	1	.790698	.589744	.935484	.685714	.621622	.678571	.468750	.617647	.870968	.705882	.648649	.604651
.90	1	.931818	.619048	1.030303	.675000	.725000	.750000	.589744	.750000	1.057143	1.000000	.850000	.717391
1.00	1	1.068182	1.050000	1.281250	.928571	1.073171	.975610	1.025641	.900000	1.105263	1.742857	1.000000	.847826

TABLE OF LAMBDA VALUES FOR STATION 14739

PLQ	I	MONTH 01	MONTH 02	MONTH 03	MONTH 04	MONTH 05	MONTH 06	MONTH 07	MONTH 08	MONTH 09	MONTH 10	MONTH 11	MONTH 12
.00	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.10	1	.000000	.000000	.000000	.166667	.000000	.000000	.000000	.000000	.000000	.400000	.111111	.000000
.20	1	.529412	.000000	.083333	.157895	.071429	.125000	.000000	.428571	.000000	.571429	.217391	.304348
.30	1	.437500	.151515	.157895	.250000	.260870	.263158	.166667	.277778	.333333	.517241	.323529	.393939
.40	1	.380952	.289474	.306122	.342857	.323529	.444444	.166667	.285714	.379310	.638889	.571429	.439024
.50	1	.365385	.333333	.339286	.463415	.357143	.531250	.437500	.333333	.315789	.707317	.687500	.489796
.60	1	.403774	.423077	.508475	.488889	.404255	.611111	.475000	.400000	.609756	.708333	.781818	.603774
.70	1	.600000	.450000	.600000	.500000	.520000	.604651	.555556	.408163	.659574	.764706	.857143	.603448
.80	1	.582090	.539683	.727273	.551724	.666667	.788462	.648148	.518519	.840000	.833333	.948276	.661290
.90	1	.714286	.712121	.808824	.830508	.737705	.896552	.859649	.677419	1.054545	.816667	1.032258	.787879
1.00	1	.716216	.913043	1.000000	.934426	1.133333	1.131148	1.046154	.746479	1.177419	.969231	1.090909	.985294

TABLE OF LAMBDA VALUES FOR STATION 14847

PLQ	I	MONTH 01	MONTH 02	MONTH 03	MONTH 04	MONTH 05	MONTH 06	MONTH 07	MONTH 08	MONTH 09	MONTH 10	MONTH 11	MONTH 12
.00	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.10	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.20	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.142857	.166667	.000000	.333333
.30	1	.250000	.166667	.000000	.210526	.000000	.100000	.166667	.090909	.250000	.272727	.230769	.500000
.40	1	.333333	.090909	.250000	.375000	.000000	.250000	.117647	.125000	.263158	.352941	.500000	.529412
.50	1	.454545	.058824	.250000	.518519	.115385	.300000	.181818	.130435	.333333	.333333	.500000	.407407
.60	1	.653846	.208333	.222222	.516129	.212121	.454545	.240000	.129032	.346154	.370370	.466667	.483871
.70	1	.781250	.290323	.206897	.500000	.378378	.517241	.277778	.216216	.393939	.785714	.757576	.500000
.80	1	.805556	.606061	.500000	.600000	.540541	.696970	.512821	.428571	.583333	1.000000	.736842	.850000
.90	1	1.000000	.783784	1.114286	.815789	.642857	.694444	.555556	.533333	.731707	1.310345	1.025641	.886364
1.00	1	1.268293	1.323529	1.307692	1.076923	.762609	.951220	.875000	.666667	.800000	1.586207	1.410256	1.277273

TABLE OF LAMBDA VALUES FOR STATION 23174

PLQ	I	MONTH 01	MONTH 02	MONTH 03	MONTH 04	MONTH 05	MONTH 06	MONTH 07	MONTH 08	MONTH 09	MONTH 10	MONTH 11	MONTH 12
.00	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.10	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.20	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.30	1	.000000	.750000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.500000
.40	1	.000000	1.000000	.000000	.000000	.000000	.500000	.000000	.000000	.000000	.000000	.000000	.750000
.50	1	.428571	1.000000	.000000	.000000	.500000	.250000	.000000	.000000	.500000	.000000	.000000	.666667
.60	1	.666667	.857143	.000000	.500000	.285714	.600000	1.000000	.000000	.333333	.428571	.125000	.625000
.70	1	.727273	.750000	.285714	.285714	.428571	.857143	.666667	.500000	.750000	.300000	.181818	.700000
.80	1	.750000	.909091	.375000	.272727	.636364	1.200000	.600000	.800000	.428571	.538462	.230769	.818182
.90	1	.750000	1.545455	.384615	.357143	.714286	1.214286	1.166667	.800000	.700000	.647059	.600000	.733333
1.00	1	1.000000	2.545455	.550000	1.125000	1.375000	2.642857	2.153846	1.312500	1.714286	1.526316	1.538462	1.266667

TABLE OF LAMBDA VALUES FOR STATION 24233

PLQ	I	MONTH 01	MONTH 02	MONTH 03	MONTH 04	MONTH 05	MONTH 06	MONTH 07	MONTH 08	MONTH 09	MONTH 10	MONTH 11	MONTH 12
.00	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.10	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.20	1	.000000	.333333	.000000	.000000	.666667	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.30	1	.227273	.055556	.090909	.100000	.250000	.250000	.000000	.142857	.000000	.136364	.291667	.277778
.40	1	.348837	.187500	.074074	.210526	.214286	.272727	.111111	.285714	.208333	.324324	.285714	.305556
.50	1	.400000	.372093	.405405	.290323	.296296	.370370	.142857	.275862	.361111	.294118	.433962	.363636
.60	1	.500000	.553191	.541667	.400000	.461538	.323529	.300000	.358974	.409091	.410714	.655172	.500000
.70	1	.625000	.860000	.660714	.653061	.530612	.575000	.461538	.545455	.580000	.584615	.903226	.671429
.80	1	1.013699	1.240000	.784615	.824561	.690909	.787234	.727273	.764706	.750000	.823529	1.145161	.943662
.90	1	1.191781	1.452830	1.000000	1.175439	.868852	.966102	.867925	1.074074	1.037736	1.134328	1.208955	1.081081
1.00	1	1.558824	1.811321	1.382353	1.327869	1.090909	1.349206	1.375000	1.500000	1.114754	1.323529	1.523077	1.383562

TABLE OF LAMBDA VALUES FOR STATION 13743

PLQ	I	MONTH 01	MONTH 02	MONTH 03	MONTH 04	MONTH 05	MONTH 06	MONTH 07	MONTH 08	MONTH 09	MONTH 10	MONTH 11	MONTH 12
.00	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.10	1	.000000	.000000	.000000	.333333	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.20	1	.230769	.000000	.056624	.333333	.000000	.000000	.000000	.000000	.222222	.000000	.041667	.266667
.30	1	.185185	.235294	.300000	.304348	.210526	.166667	.000000	.000000	.294118	.080000	.058824	.296296
.40	1	.255814	.232558	.394737	.517241	.346154	.227273	.000000	.125000	.545455	.250000	.170732	.406250
.50	1	.300000	.264151	.488372	.542857	.433333	.370370	.083333	.333333	.642857	.358974	.260000	.511628
.60	1	.333333	.355932	.555556	.666667	.384615	.375000	.142857	.406250	.588235	.386364	.259259	.620000
.70	1	.456140	.466667	.527273	.739130	.444444	.452381	.317073	.461538	.731707	.464286	.431034	.696429
.80	1	.634921	.622951	.724138	.685185	.600000	.560000	.562500	.529412	.829787	.694915	.538462	.692308
.90	1	.676471	.651515	.796875	.918033	.593750	.629032	.905660	.733333	.980769	.935484	.686567	.923077
1.00	1	.685714	.739130	.970588	1.044118	1.046875	1.000000	1.315789	.909091	1.032258	1.174603	.830986	1.190476

TABLE OF LAMBDA VALUES FOR STATION 13983

PLQ	I	MONTH 01	MONTH 02	MONTH 03	MONTH 04	MONTH 05	MONTH 06	MONTH 07	MONTH 08	MONTH 09	MONTH 10	MONTH 11	MONTH 12
.00	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.10	1	.000000	.250000	.100000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.250000	.000000
.20	1	.357143	.117647	.550000	.083333	.000000	.000000	.000000	.000000	.000000	.000000	.250000	.117647
.30	1	.615385	.200000	.607143	.300000	.250000	.142857	.250000	.000000	.000000	.312500	.190476	.416667
.40	1	.525000	.365854	.750000	.354839	.166667	.181818	.100000	.083333	.100000	.321429	.303030	.656250
.50	1	.612245	.533333	.707317	.375000	.259259	.315789	.210526	.111111	.260870	.424242	.625000	.939394
.60	1	.777778	.604167	.750000	.468085	.388889	.275862	.400000	.125000	.297297	.555556	.857143	1.105263
.70	1	.864407	.764706	.679245	.462963	.511628	.358974	.342105	.147059	.477273	.627907	.854167	1.000000
.80	1	1.120690	.867925	.888889	.616667	.685185	.489796	.413043	.209302	.630435	.739130	.736842	1.183673
.90	1	1.275862	1.000000	1.000000	.709677	.842105	.614035	.472727	.537037	.820000	.940000	.870968	1.207547
1.00	1	1.333333	1.175439	1.229508	.969697	.968750	1.155172	.820896	.898305	1.087719	1.052632	1.015152	1.315789

TABLE OF LAMBDA VALUES FOR STATION 23154

PLQ	I	MONTH 01	MONTH 02	MONTH 03	MONTH 04	MONTH 05	MONTH 06	MONTH 07	MONTH 08	MONTH 09	MONTH 10	MONTH 11	MONTH 12
.00	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.10	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.20	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.30	1	.666667	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.166667
.40	1	.428571	.166667	.000000	.000000	.000000	.250000	.000000	.000000	.000000	.090909	.100000	.166667
.50	1	.250000	.416667	.055556	.076923	.200000	.285714	.000000	.000000	.000000	.142857	.312500	.250000
.60	1	.225806	.384615	.260870	.217391	.296296	.266667	.000000	.333333	.150000	.200000	.200000	.375000
.70	1	.421053	.275000	.264706	.454545	.485714	.650000	.130435	.380952	.240000	.444444	.387097	.633333
.80	1	.586957	.400000	.384615	.590909	.727273	.900000	.300000	.617647	.363636	.621622	.534884	1.000000
.90	1	.857143	.924528	.890909	.882353	1.060000	1.095238	1.232558	.847826	.510638	.733333	.627451	.916667
1.00	1	1.213115	1.293103	1.362069	1.333333	1.438596	1.460000	2.044444	1.450980	1.207547	1.076923	.822581	1.052632

TABLE OF LAMBDA VALUES FOR STATION 24225

PLG	I	MONTH 01	MONTH 02	MONTH 03	MONTH 04	MONTH 05	MONTH 06	MONTH 07	MONTH 08	MONTH 09	MONTH 10	MONTH 11	MONTH 12
.00	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.10	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.20	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.250000
.30	1	.066667	.222222	.000000	.000000	.000000	.000000	.000000	.000000	.166667	.000000	.307692	.133333
.40	1	.225806	.222222	.187500	.000000	.000000	.000000	.000000	.250000	.375000	.000000	.444444	.269231
.50	1	.525000	.517241	.250000	.000000	.095238	.071429	.166667	.200000	.545455	.333333	.487805	.291667
.60	1	.588235	.512821	.487805	.103448	.235294	.285714	.300000	.250000	.625000	.666667	.500000	.784314
.70	1	.819672	.638298	.740000	.365854	.500000	.440600	.312500	.500000	.692308	.764706	.689655	1.071429
.80	1	1.140625	.842105	.981481	.653846	.795918	.656250	.285714	.368421	.727273	.857143	1.137931	1.350877
.90	1	1.406250	1.400000	1.166667	.813559	.886889	1.000000	.354839	.655172	.833333	1.145833	1.482759	1.745455
1.00	1	1.651515	1.625000	1.637931	1.456140	1.357143	1.100000	1.074074	1.367347	1.173913	1.580000	1.925926	2.479167

TABLE OF LAMBDA VALUES FOR STATION 93193

PLG	I	MONTH 01	MONTH 02	MONTH 03	MONTH 04	MONTH 05	MONTH 06	MONTH 07	MONTH 08	MONTH 09	MONTH 10	MONTH 11	MONTH 12
.00	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.10	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.20	1	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.400000
.30	1	.300000	.222222	.142857	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.100000	.705882
.40	1	.555556	.333333	.222222	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.166667	.913043
.50	1	.666667	.363636	.214286	.214286	.200000	.000000	.000000	.000000	.000000	.222222	.260870	.991176
.60	1	.772727	.756757	.185185	.450000	.166667	.000000	.000000	.000000	.166667	.363636	.384615	1.289474
.70	1	.860000	1.028571	.307692	.521739	.153846	.125000	.200000	.000000	.090909	.555556	.531250	1.375000
.80	1	1.035714	1.153846	.458333	.821429	.343750	.071429	.538462	.307692	.285714	.625000	.525000	1.382979
.90	1	1.321429	1.295455	.826923	.777778	.558140	1.111111	1.818182	1.148148	.933333	.717949	.790698	1.571429
1.00	1	1.327869	1.714286	1.321429	1.500000	1.200000	5.478261	8.235294	3.189189	3.333333	1.370370	1.109091	2.127660

APPENDIX D

WORST CASE DAYS TABLE

TABLE OF NUMBERS OF SEQUENTIAL WORST CASE DAYS

LAMBDA	ALPHA .00	.10	.20	.30	.40	.50	.60	.70	.80	.90	.93	.95	.98	.99	.9900	.9990	.9999	1.00000
.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	••
.250	0	0	0	0	0	0	0	0	0	1	1	1	2	2	3	4	4	••
.500	0	0	0	0	0	1	1	1	1	2	2	2	3	3	4	5	6	••
.750	0	0	0	0	1	1	1	1	2	2	3	3	4	4	5	6	7	••
1.000	0	0	0	0	1	1	1	2	2	3	3	4	4	5	6	7	8	••
1.250	0	0	0	1	1	1	2	2	3	3	4	4	5	5	6	8	8	••
1.500	0	0	0	1	1	1	2	2	3	4	4	5	5	6	7	8	9	••
1.750	0	0	1	1	1	2	2	2	3	4	4	5	6	6	8	8	10	••
2.000	0	0	1	1	1	2	2	3	3	4	5	5	6	7	8	9	10	••
2.250	0	0	1	1	2	2	2	3	3	4	5	5	6	6	8	10	11	••
2.500	0	0	1	1	2	2	3	3	4	5	5	6	6	7	9	10	12	••
2.750	0	0	1	1	2	2	3	3	4	5	5	6	7	7	9	11	12	••
3.000	0	0	1	2	2	3	3	4	4	5	6	6	7	8	10	11	13	••
3.250	0	0	1	2	2	3	3	4	5	6	6	7	8	8	10	12	13	••
3.500	0	0	2	2	2	3	4	4	5	6	6	7	8	9	11	12	14	••
3.750	0	0	2	2	3	3	4	4	5	6	7	7	8	9	11	13	14	••
4.000	0	0	2	2	3	3	4	4	5	6	7	7	9	9	11	13	15	••
4.250	0	0	2	2	3	4	4	5	6	7	7	8	9	10	12	14	15	••
4.500	0	0	2	3	3	4	4	5	6	7	8	8	9	10	12	14	16	••
4.750	0	0	2	3	3	4	5	5	6	8	8	9	10	10	13	15	17	••
5.000	0	0	2	3	4	4	5	5	7	8	8	9	10	11	13	15	17	••
5.250	0	0	2	3	4	5	5	6	7	8	9	9	10	11	14	16	18	••
5.500	0	0	3	3	4	5	5	6	7	9	9	10	11	12	14	16	18	••
5.750	0	0	3	4	4	5	6	7	8	9	9	10	11	12	14	17	19	••
6.000	0	0	3	4	5	5	6	7	8	9	10	10	12	12	15	17	19	••
6.250	0	0	3	4	5	5	6	7	8	10	10	11	12	13	15	17	20	••
6.500	0	0	3	4	5	6	6	7	8	10	10	11	13	13	16	18	20	••
6.750	0	0	4	4	5	6	7	8	9	10	11	11	13	14	16	18	20	••
7.000	0	0	4	5	5	6	7	8	9	10	11	12	13	14	16	19	21	••
7.250	0	0	4	5	6	7	7	8	9	11	11	12	13	14	17	19	21	••
7.500	0	0	4	5	6	7	8	9	10	11	12	12	14	15	17	20	22	••
7.750	0	0	4	5	6	7	8	9	10	11	12	13	14	15	18	20	22	••
8.000	0	0	5	6	6	7	8	9	10	12	12	13	14	15	18	20	23	••
8.250	0	0	5	6	7	8	8	9	11	12	13	13	15	16	18	21	23	••
8.500	0	0	5	6	7	8	9	9	11	12	13	14	15	16	19	21	23	••
8.750	0	0	5	6	7	8	9	10	11	13	13	14	15	16	19	22	24	••
9.000	0	0	5	6	7	8	9	10	11	13	14	14	16	17	20	22	24	••
9.250	0	0	5	7	8	8	9	10	11	13	14	15	16	17	20	22	25	••
9.500	0	0	6	7	8	9	9	10	11	14	14	15	16	17	20	23	25	••
9.750	1	0	6	7	8	9	10	10	11	14	15	15	17	18	21	23	26	••
10.000	1	0	6	7	8	9	10	11	12	14	15	15	17	18	21	24	26	••

•• INDICATES THAT ENTIRE MONTH IS TO BE USED

NASA—JPL—Coml., L.A., Calif.